

"Celebrating 50 Years of Togetherness"



46<sup>th</sup> ANNUAL REPORT  
2015-2016

**The Automotive Research Association of India**

## Vision and Mission Statement

### Vision

ARAI has a strong base of state-of-the-art technology equipment, laboratory facilities and highly qualified and experienced personnel. With these assets, ARAI has goals, strategies and action plans to achieve the fullest customer satisfaction. These are:-

- (a) to compete in service with excellence
- (b) to obtain recognition and accreditation
- (c) to cover global market
- (d) to build commitment of all personnel
- (e) to develop team spirit and sense of belonging amongst all.

### Mission

- ARAI has been providing various services to the Indian Automotive Industry in the areas of design & development and know-how for manufacture & testing of components/ system to national/ international standards. ARAI shall strive to achieve international recognition in these areas.
- ARAI shall seek the valuable guidance and support from our members, from time to time to achieve growth and stability.
- With the globalisation of economy and business, ARAI shall enlarge its scope of services to meet the requirements of automotive industries anywhere in the world.
- ARAI strongly believes that satisfaction of customer needs on continuing basis, is of prime importance to earn the loyalty of the customers. Therefore, emphasis shall be on meeting and exceeding the customer needs through continuing quality improvement with active participation of employees and also customers.

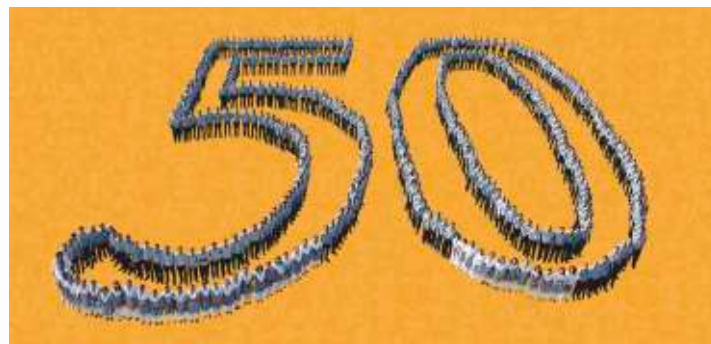
## Celebrating 50 Years of Togetherness



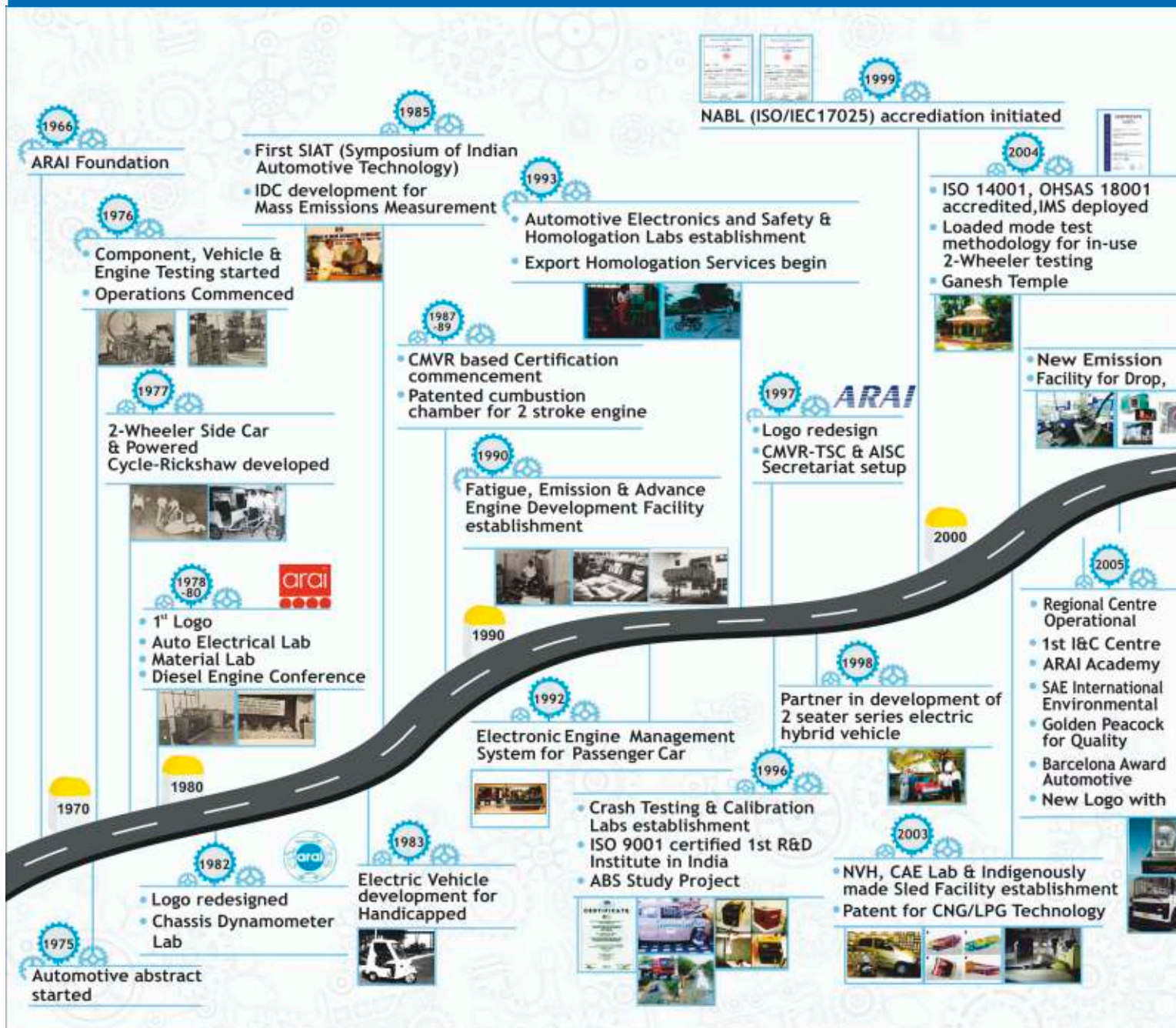
*We The People*



YEARS OF BUILDING AUTOMOTIVE EXCELLENCE  
1966 - 2016



*Our Team Today*

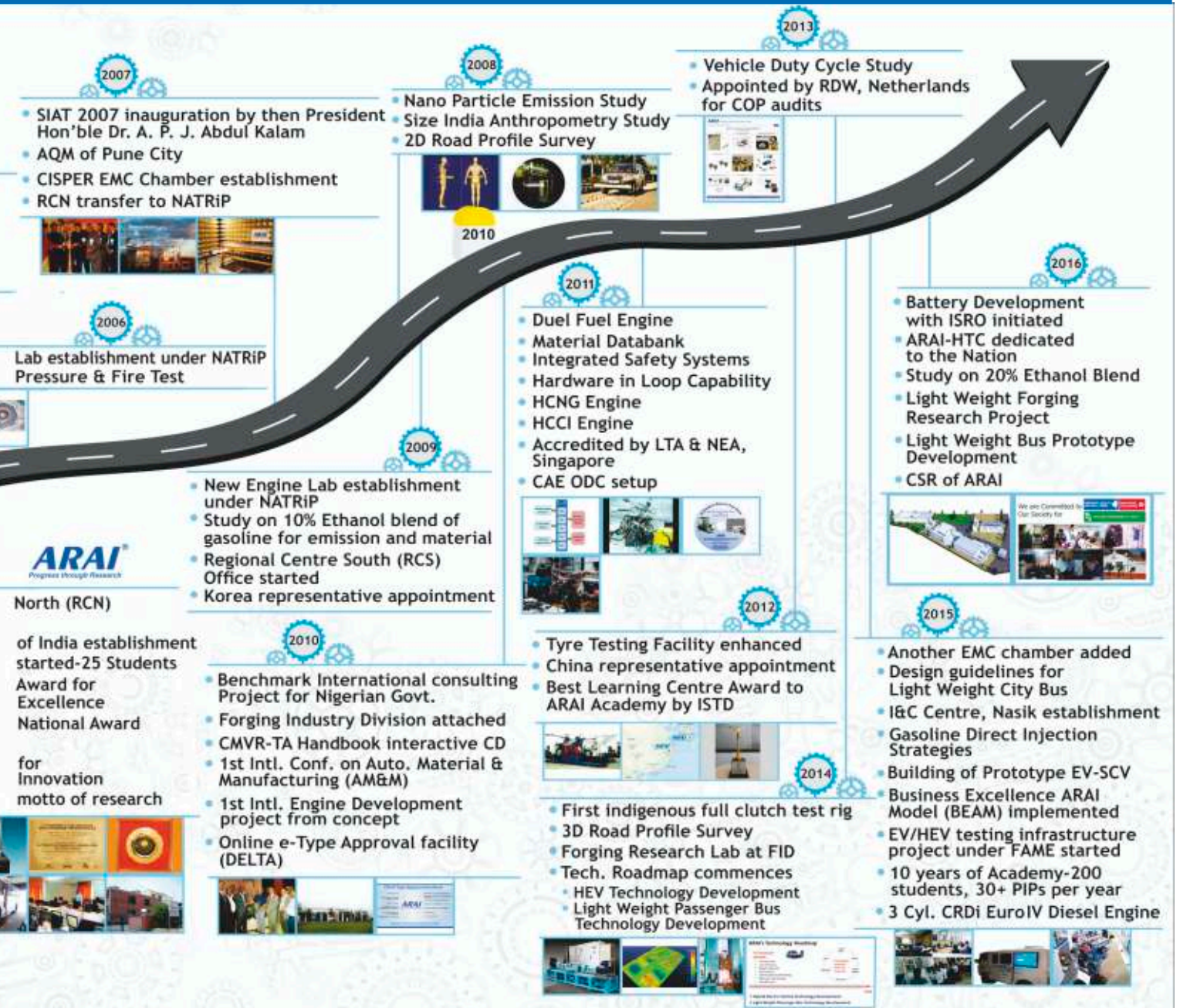


**The Automotive Research**  
 Research Institution of the  
 with the Ministry of Heavy Industries &



YEARS OF BUILDING AUTOMOTIVE EXCELLENCE  
1966 - 2016

# Journey Towards MAKE IN INDIA



**Association of India**  
Automotive Industry  
Public Enterprises, Govt. of India

[www.araiindia.com](http://www.araiindia.com)

## Golden Jubilee Year Celebrations

ARAI is celebrating its Golden Jubilee Year. Starting off in 1966 on a modest note, ARAI has transformed to a renowned global R&D, Certification and Testing institute. Over these years, ARAI has continuously demonstrated its ability to capitalize quickly and decisively to changing market dynamics and technologies. This attribute has helped ARAI to evolve, grow and more importantly, launch itself in the global platform.

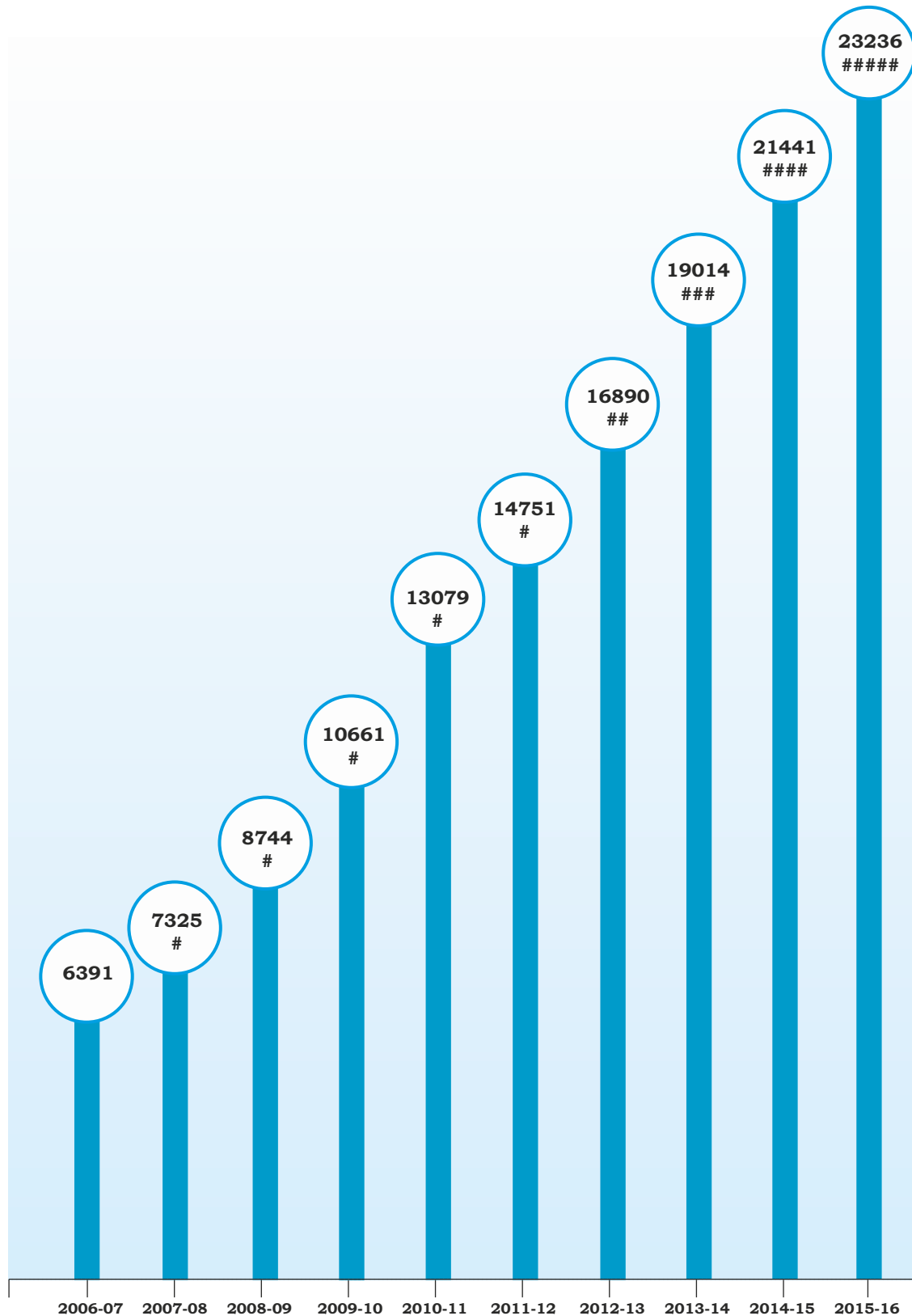
ARAI's Golden Jubilee Year Celebrations commenced with the launch of Golden Jubilee Year Logo on 3rd January 2016 at the auspicious hands of Shri Devendra Fadnavis, Hon'ble Chief Minister, Government of Maharashtra and in the presence of Dr. K. Sivan, Director, Vikram Sarabhai Space Centre, ISRO, Thiruvananthapuram and dignitaries from the automotive industry. To commemorate this significant milestone various events have been planned. Some of these events are given below.

### Events Planned

- **ARAI Golden Jubilee Scientist Meet:** To honour contribution of eminent scientists in various fields. Theme of this event will be energy conservation, efficiency, alternatives & socio - economic aspects
- **ARAI Golden Jubilee Young Engineer Award:** To recognize young engineers for contributing their expertise for benefit of automotive industry at large
- **Road Safety Awareness (Short Film Making Contest):** To address important issue of Road Safety awareness like driving conditions, safety gadgets, vehicle maintenance, pedestrian's safety etc.
- **Exhibition of renowned Cartoonist, Shri Mangesh Tendulkar's Cartoons:** Exhibition of special cartoons planned for awareness of general public on the subject of Safety and Environmental protection
- **Lecture Series by Eminent Personalities for ARAI Employees:** Some of these include address by a Padmabhushan Awardee and prolific writer Dr. B. M. Hegde on "The wellness concept" and lecture by Chairman of 'Pune Vipashyana Centre' Dr Datta Kohinkar on "Stress management to improve work skill"
- **Special Events for ARAI Employees :** Inter Departmental Sports Championship

# TOTAL INCOME

Rs. in Lakh



# Excluding Interest on earmarked fund transferred to respective fund and funds transferred from R & D reserve fund.  
## Excluding Interest on earmarked fund transferred to respective fund Rs. 2353 lakhs and fund transferred from R & D reserve fund Rs. 48 Lakhs.  
### Excluding Interest on earmarked fund transferred to respective fund Rs. 2774 lakhs and fund transferred from R & D reserve fund Rs. 34 Lakhs.  
#### Excluding Interest on earmarked fund transferred to respective fund Rs. 2253 lakhs and fund transferred from R & D reserve fund Rs. 81 Lakhs.  
##### Excluding Interest on earmarked fund transferred to respective fund Rs. 2498 lakhs and fund transferred from R & D reserve fund Rs. 65 Lakhs.

# Highlights of the Year

- 12.7% YoY growth in Operational Income
- Celebrating our Golden Jubilee Year
- Inauguration of ARAI – Homologation and Technology Centre (ARAI – HTC), Chakan
- Crash test facility at ARAI – HTC now operational and correlation studies of crash data carried out successfully
- Facilities for certification testing of Electric and Hybrid Electric Vehicles being established at ARAI – HTC
- ARAI registered with Department of Infrastructure, Australia for providing Type Approval Reports in compliance to ADRs (Australian Design Rules)
- Working with Vikram Sarabhai Space Centre (VSSC), ISRO on battery development for automotive applications



## Governing Council Members : 2015-16

<b>President</b>	: Mr. Rajan Wadhwa, President and Chief Executive, Truck PowerTrain Division, Head - Mahindra Research Valley, Member of the Group Executive Board, Mahindra & Mahindra Ltd.
<b>Vice President</b>	: Mr. Vikram Kirloskar, Vice Chairman, Toyota Kirloskar Motor Pvt. Ltd.
<b>Director</b>	: Mrs. Rashmi Urdhwaresha

### Members

- |                                         |                                   |                                      |
|-----------------------------------------|-----------------------------------|--------------------------------------|
| 1. Ashok Leyland Ltd.                   | 9. General Motors India Pvt. Ltd. | 17. Tata Motors Ltd.                 |
| 2. Bajaj Auto Ltd.                      | 10. Honda Cars India Ltd.         | 18. Toyota Kirloskar Motor Pvt. Ltd. |
| 3. Bosch Ltd.                           | 11. Hyundai Motor India Ltd.      | 19. Tractor and Farm Equipment Ltd.  |
| 4. Cummins India Ltd.                   | 12. Mahindra & Mahindra Ltd.      | 20. TVS Motor Co. Ltd.               |
| 5. Cummins Technologies India Pvt. Ltd. | 13. Maruti Suzuki India Ltd.      | 21. VE Commercial Vehicles Ltd.      |
| 6. Eicher Motors Ltd.                   | 14. Piaggio Vehicles Pvt. Ltd.    | 22. Volkswagen India Pvt. Ltd.       |
| 7. Fiat India Automobiles Pvt. Ltd.     | 15. Simpson & Co. Ltd.            | 23. Volvo India Pvt. Ltd.            |
| 8. Force Motors Ltd.                    | 16. Tata Cummins Pvt. Ltd.        | 24. Wheels India Ltd.                |

### Govt. of India Representatives

**Mr. Ambuj Sharma**  
Additional Secretary  
Govt of India  
Ministry of Heavy Industries & Public Enterprises  
Department of Heavy Industry  
Udyog Bhavan, New Delhi 110 011

**Mr. A.M. Manichan**  
Deputy Secretary  
Govt of India  
Ministry of Heavy Industries & Public Enterprises  
Department of Heavy Industry  
Udyog Bhavan, New Delhi 110 011

**Mr. Sushil Lakra**  
Industrial Adviser  
Govt of India  
Ministry of Heavy Industries & Public Enterprises  
Department of Heavy Industry  
Udyog Bhavan, New Delhi 110 011

### Address

Survey No. 102, Vetal Hill  
Off Paud Road, Kothrud  
Pune 411 038, INDIA  
Phone : 91-20-3023 1111, 3023 1200  
Fax : 91-20-3023 1104  
Email: director@araiindia.com

### Bankers

Bank of Baroda  
HDFC Bank Ltd.

### Status of Institute

Registered under  
The Societies Registration Act,  
XXI of 1860 Regn. No. 133/66  
GBBSD dated 10.12.1966

### Invitees

- Society of Indian Automobile Manufacturers
- Automotive Component Manufacturers Association of India
- Tractor Manufacturers Association
- National Automotive Testing and R&D Infrastructure Project

### Auditors

M/s. A.R. Sulakhe & Co.  
Chartered Accountants  
Head Office : Anand Apartment, 1180/2,  
Shivajinagar, Pune 411 005

### Secretary to the Governing Council

Mrs. Prajakta M. Dhere

## Members : 2015 - 16

1. Ashok Leyland Ltd.
2. AMW Motors Ltd.
3. Atul Auto Ltd.
4. A.J. Auto Pvt. Ltd.
5. Bajaj Auto Ltd.
6. Behr-Hella Thermocontrol (India) Pvt. Ltd.
7. Bharat Forge Ltd.
8. Bharat Seats Ltd.
9. Bosch Limited
10. Brakes India Ltd.
11. Cummins India Ltd.
12. Cummins Technologies India Pvt. Ltd.
13. Delphi-TVS Diesel Systems Ltd.
14. Eicher Motors Ltd.
15. Enginetech Systems Pvt. Ltd.
16. FCA India Automobiles Pvt Ltd \*
17. Fiat India Automobiles Pvt. Ltd.
18. Force Motors Ltd.
19. Ford India Pvt. Ltd.
20. F P Seating Systems Pvt. Ltd.
21. General Motors India Pvt. Ltd.
22. Greaves Cotton Ltd.
23. Hero Electric Vehicles Pvt. Ltd.
24. Hindustan Motors Ltd.
25. Honda Cars India Ltd.
26. Hyundai Motor India Ltd.
27. International Cars and Motors Ltd.
28. JCBL Ltd.
29. Johnson Controls Automotive Ltd.
30. Kanda Auto Pvt Ltd.
31. Kirloskar Oil Engines Ltd.
32. KPIT Technologies Ltd. \*
33. KSS Abhishek Safety Systems Pvt. Ltd.
34. Lear Automotive India Pvt. Ltd.
35. Lombardini India Pvt. Ltd.
36. Madras Engineering Industries Pvt Ltd.
37. MMAuto Industries Ltd.
38. Mahindra Gujarat Tractor Ltd.
39. Mahindra Heavy Engines Ltd. \*
40. Mahindra & Mahindra Ltd.
41. Mahindra Reva Electric Vehicles Pvt. Ltd.
42. Man Trucks India Pvt. Ltd.
43. Mansons Automotive Rubber Pvt. Ltd.
44. Maruti Suzuki India Ltd.
45. Mercedes-Benz India Pvt. Ltd.
46. MLR Motors Ltd. ~
47. MSKH Seating Systems India (P) Ltd.
48. Piaggio Vehicles Pvt. Ltd.
49. P M Diesels Pvt Ltd.
50. Power Electronics
51. Premier Ltd.
52. Randhawa Automobile Engineering Pvt. Ltd.
53. Rinder India Pvt. Ltd.
54. Rocket Engineering Corporation Pvt. Ltd.
55. Rohan BRC Gas Equipment Pvt. Ltd.
56. Rotary Electronics Pvt Ltd.
57. Scooters India Ltd.
58. Simpson & Co. Ltd.
59. Skoda Auto India Pvt. Ltd.
60. S. M. Auto Engineering Pvt. Ltd.
61. SML Isuzu Ltd
62. Spaco Technologies (India) Pvt. Ltd.
63. Sri Ramdas Motor Transport Ltd.
64. Tata Cummins Pvt. Ltd.
65. Tata Motors Ltd.
66. Toyota Kirloskar Motor Pvt. Ltd.
67. Tractors and Farm Equipment Ltd.
68. TVS Motor Co. Ltd.
69. Ucal Products Pvt. Ltd. ~
70. Vanaz Engineers Ltd
71. Varroc Lighting Systems (India) Pvt. Ltd.
72. VE Commercial Vehicles Ltd.
73. Virama Laminates Pvt Ltd
74. Volvo India Pvt. Ltd.
75. Volkswagen India Pvt. Ltd.
76. WABCO India Ltd.
77. Wheels India Ltd.

\* - Granted membership during the year 2015-16

~ - Withdrew membership during the year 2015-16

## Committees : 2015 - 16

### Finance & Internal Audit Committee (FIAC)

#### CHAIRMAN

**Mr. Vikram Kirloskar**

Vice President - ARAI

Vice Chairman, Toyota Kirloskar Motor Pvt. Ltd.

#### MEMBERS

**Mr. A. M. Manichan,**

Dy. Secretary,  
Government of India,  
Ministry of Heavy Industries  
& Public Enterprises,  
Department of Heavy Industry

**Mr. N D Pathak**

Chairman & Managing Director,  
Spaco Technologies (India) Pvt. Ltd.

**Mr. R.R. Deshpande**

Jt. Managing Director,  
Kirloskar Oil Engines Ltd.

**Mr. Suhas Kadlaskar**

Vice President  
Corporate Affairs & Human Resources  
Mercedes-Benz India Pvt. Ltd.

**Mr. Venugopal P Rao**

Head (NPI-CVBU Business Planning),  
Tata Motors Ltd.,

**Mr. Gajanan Chinchwadkar**

Sr. General Manager - F&A  
Mahindra & Mahindra Ltd.

**Mr. Pankaj Gupta**

Vice President-External Affairs & CSR,  
Volkswagen India Pvt. Ltd.

**Ms. Soma Ghosh**

Finance Director -  
India Technical Organisation,  
Cummins Technologies India Pvt. Ltd.

**Mrs. Rashmi Urdhwareshe**

Director-ARAI

**Mr. Sadanand Shahane**

Deputy Director (Finance & Accounts)  
Member Secretary, FIAC - ARAI

### Project Evaluation & Monitoring Committee (PEMC)

#### CHAIRMAN

**Mr. Jayanta Kumar Deb**

Sr Vice President, Head - Product Development (Automotive Sector),  
Mahindra & Mahindra Ltd.

#### MEMBERS

**Mr. Sushil Lakra**

Industrial Adviser  
Government of India  
Ministry of Heavy Industries & Public  
Enterprises, Department of Heavy Industry

**Mr. Rajinder S Sachdeva**

Executive Vice President & Head -  
Technology  
V E Commercial Vehicles Limited

**Mr. I V Rao**

Executive Advisor,  
Maruti Suzuki India Ltd.

**Mr. S. Janardhanan**

Vice President (Co-ordination)  
Simpson & Co. Ltd.

**Mr. Vinay Harne**

President - NPD  
TVS Motor Co. Ltd.

Alternate member

**Mr. Y. Ramachandra Babu**

Adviser - R&D,  
TVS Motor Co. Ltd.

**Mr. Michael Poznanski Eisenschmidt**

Technical Head  
Volkswagen India Pvt. Ltd.

**Mr. Ashok Yewale**

Deputy CTO  
Force Motors Limited

**Mr. R. Narasimhan**

Vice President (R&D)  
Bajaj Auto Ltd.

**Dr. N. Saravanan**

Head (Engineering)  
Ashok Leyland Limited

**Mr. T R Kesavan**

Chief Operating Officer  
Tractors and Farm Equipment Limited

**Mr. Brian McMurray**

Director, Vehicle Integration  
General Motors India Engineering

**Mrs. Rashmi Urdhwareshe**

Director-ARAI

**Mr. Nitin Dhande**

Sr. Deputy Director

**Mr. Suyog Gadgil**

Deputy Manager  
Member Secretary, PEMC - ARAI

There is also a 'Sub-committee of PEMC' to review and monitor projects of ARAI - Forging Industry Division.



**Mr. Rajan Wadhra**  
President - ARAI

## President's Statement



**Mr. Vikram Kirloskar**  
Vice President

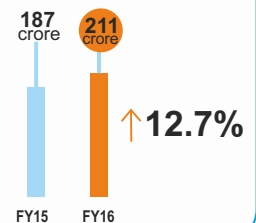
Dear Members,

It is a privilege to present our Annual Report for the Financial Year 2015-16 in the midst of our Golden Jubilee Year. Our consistent healthy performance echoes the vision and business acumen of our Institute. It signifies maturing of a process – a process that was initiated more than four decades ago based on the conviction that we can build a world class testing and research institute.

What began way back in 1966 is a success story that continues as the journey takes us to great heights every year. With its well established R&D capabilities, ARAI has transformed itself to become an integrated Certification and Research Institute. It is indeed a matter of pride that today, in the 50th year of our glorious existence we are a valued and indispensable partner for our stakeholders.

As we celebrate the Golden Jubilee Year, our Operational Income has crossed a significant milestone of Rs.200 crore, registering YoY growth of 12.7% to reach Rs.211.14 crore.

"...It is indeed a matter of pride that today, in the 50th year of our glorious existence we are a valued and indispensable partner for stakeholders.."



Focus areas of R&D Technology Roadmap: Light Weighting and Electric/Hybrid Electric vehicle technologies

### Building Competencies through Research

Our continued focus on research is paying rich dividends as competencies developed from projects have created additional business avenues, thereby enhancing our service portfolio. The year has seen successful completion of three internally funded and two Department of Heavy Industry (DHI) supported projects. The internal projects were on configuring and building an Electric Vehicle out of a conventional intra-city public transport Small Commercial

Vehicle (SCV); statistical energy analysis for noise control and transmission development for Light Commercial Vehicle (LCV) application. Similarly, the two DHI supported projects completed were on study of material compatibility with Ethanol blended Gasoline (E20) and development of design guidelines for lightweight city bus.

The year also saw commencement of eight new projects supported by DHI (six under cess funding and two under Faster Adoption and Manufacturing of Hybrid and Electric Vehicles – FAME-India initiative). These projects are in sync with our R&D Technology Roadmap areas, i.e. light weighting and electric / hybrid electric vehicle technologies. The other ongoing projects under execution are moving with the right pace and in the right direction as envisaged.

### Gearing up to Future Requirements

While we are engaged in development of affordable solutions, certification activity remains pivotal to our strategy. Advent of new emission and safety norms in the near future calls for equipping ourselves with necessary infrastructure and capabilities to meet future certification and testing requirements of the automotive industry. Facilities set-up at ARAI – Homologation and Technology Centre (ARAI – HTC), Chakan under National Automotive Testing and R&D Infrastructure Project (NATRiP) will help in catering to industry's future needs. This new centre was inaugurated on 4th January 2016 at the auspicious hands of Shri Anant Geete, Hon'ble Minister for Heavy Industries & Public Enterprises, Government of India. Also, necessary testing infrastructure required for certification testing of electric and hybrid electric vehicles is being established here under DHI's FAME-India initiative. Along with capacity building, we are also

focusing on development of competencies required for the future regulations through training programmes for our technical teams. I am sure, these capacity and competency building initiatives will enable us to serve the industry's future needs.

### Inspection & Certification Centres

This year, we were awarded with contract for facilitating establishment of Inspection & Certification (I&C) centre in the state of Kerala under an initiative of Ministry of Road Transport & Highways (MoRTH). This is in addition to the contracts awarded earlier for six other states. Out of these six, the centre at Nasik in Maharashtra is already operational.

173 Automotive Industry Standards published till date

### Standards Formulation

Ten Automotive Industry Standards (AIS) were released during 2015-16, taking the total standards published till date to 173 covering wide range of subjects for different categories of motor vehicles.

### Knowledge Dissemination

On knowledge dissemination front, we organized 45 Proficiency Improvement Programmes and 3 Domain Training Programmes for industry personnel. Also, to nurture budding engineers, we offer Ph. D., M. Tech, M. S. and B. Tech. programmes in various automotive disciplines through our collaborations with VIT University, Vellore; VELTECH University, Chennai; College of Engineering, Pune; and University of Alabama, USA.

### Golden Jubilee Year Celebrations

To commemorate our Golden Jubilee Year, various activities have been planned throughout the year. Our celebrations commenced with the launch of our Golden Jubilee logo on 3rd January 2016 at the auspicious hands of Shri Devendra Fadnavis, Hon'ble Chief Minister, Government of Maharashtra.



### Upcoming Event - SIAT 2017



The fifteenth edition of 'Symposium on International Automotive Technology' SIAT 2017 will be organized from 18th to 21st January 2017 in association with SAEINDIA, NATRIP and SAE International (USA). The theme of upcoming SIAT edition is **"Smart, Safe & Sustainable Mobility"**. SIAT EXPO 2017, which will be held concurrently with the symposium, will provide an avenue for

showcasing latest automotive technologies, products and services. SIAT 2017 will also mark the culmination of our Golden Jubilee Year celebrations.

### Corporate Social Responsibility

At ARAI, growth is not measured by financials alone, but also by contribution made to the society and the environment around us. We have always been at the forefront of CSR activity and this year was no different. This year, projects on 'Community Development' and 'Swachh Bharat Abhiyan' were initiated in addition to projects in the areas of Education and Health.

CSR : Focus on Education, Health, Community Development and Swachh Bharat Abhiyan

### Looking Ahead

The year gone by was an eventful one and the future looks bright due to immense opportunities. I am confident that with our widening service portfolio, together with establishment of facilities for future regulatory needs, our business segments – certification and technology solutions will be on fast track in the coming years. As we enter the next phase of growth, I would like to reiterate our commitment to engage with issues that challenge the automotive sector and also, play a key role in providing customer centric solutions.

"I would like to reiterate our commitment to engage with issues that challenge the automotive sector and also, play a key role in providing customer centric solutions"

In conclusion, I would like to sincerely thank the Vice President & Members of the Governing Council; Department of Heavy Industry (DHI); the Chairman and Members of Project Evaluation and Monitoring Committee; the Chairman and Members of Finance and Internal Audit Committee; and ARAI Members for their unstinted support. I am confident, with members support and expertise the institute has gained over the past five decades, we would steer this institute with continued success into the future.

Also I congratulate Director and entire ARAI team for their contributions towards the growth of ARAI. My best wishes for the Golden Jubilee Year Celebrations of ARAI.

**Rajan Wadhwa**



**Mrs. Rashmi Urdhwareshe**  
Director

## Director's Report

The Governing Council of ARAI has great pleasure in presenting the Annual Report along with Technical Report and Audited Statement of Accounts for the year ending 31st March 2016.

Year 2015-16 was an eventful and exciting year for us at ARAI! As we stepped into the Golden Jubilee Year, it opened up doors for future growth and progress. This year too, we continued with the tradition of bettering our performance, registering over 12% growth in Operational Income to end the year at Rs.211.14 crore. The growth is not merely limited to the figures in Balance Sheet but also covers our achievements in Research outcome, addition of new capabilities / services and enhanced global reach.

### OPERATIONAL INCOME

12.7% ↑

*"Every milestone we cross, enthruses us to achieve more. But what gives us immense satisfaction and fulfilment is the consistent performance and sustained growth."*

Every milestone we cross, enthruses us to achieve more. But what gives us immense satisfaction and fulfilment is the consistent performance and sustained growth. Our conviction to build the future through focus on research & developmental work and strategic investments has been the backbone for our consistency.

In my message last year, I had stated that with new facilities in place and with development of newer skills and services from our projects, we will emerge much stronger in the competitive global world.

In this context, it is heartening that our crash test facility at ARAI-HTC has become operational and correlation studies of crash test data have been carried out successfully. It has also received accreditation from global approving authorities. Further, with establishment of facilities for certification testing of electric and hybrid electric vehicles under DHI's support, we will be in a position to cater to growing needs of automotive industry in this sector.

Through a well-defined R&D focus, we are strengthening our research and innovation capabilities to deliver significant value in the future. This year, we took up bold steps and launched a programme with Vikram Sarabhai Space Center, ISRO, for battery development. Under this strategic project, adaption of space technology of Li-ion to automotive applications is being explored.

*"While stepping into the future, strengthening service quality and customer satisfaction remains our top priority."*

While stepping into the future, strengthening service quality and customer satisfaction remains our top priority. While we maintain confidence about the quality of all our services, our efforts will be towards ensuring that ARAI continues to be an organization that is trusted, respected and highly regarded.

We have grown from strength to strength to reach where today we are. It has been a challenging and exciting journey that has enriched our stakeholders. I can proudly say that passion, resilience and perseverance of our strong team of 650+ employees has enabled us to endure and thrive in these challenging and rapidly changing times.

*"passion, resilience and perseverance of our strong team of 650+ employees has enabled us to endure and thrive in these challenging and rapidly changing times."*

On behalf of Team ARAI, I would like to thank the President, Vice President, Senior Officials from the Department of Heavy Industry (DHI), Members of the Governing Council, Members of Finance & Internal Audit Committee, Members of Project Evaluation & Monitoring Committee and ARAI Members for their valuable contribution and guidance.

**Mrs. Rashmi Urdhwareshe**

## Operational Highlights

### Finance & Accounts

The Income & Expenditure Account, Balance Sheet and Auditor's Report are presented herewith.

- **Financial performance**

ARAI has continued to show excellent performance during the Financial Year 2015-16. The Income Target has been achieved and Operational Income has gone up by 12.73% to Rs. 21114.65 lakh as compared to Rs. 18730.68 lakh in 2014-15. The Total Income, including Membership Subscription, Interest, etc. has reached a figure of Rs. 25735 lakh (excluding funds transferred from R&D reserve fund) as compared to Rs. 23694 lakh of last year. This is the result of several measures undertaken in overall ARAI governance, in areas such as finance, purchase, invoicing procedure, time management, productivity improvement, competence building and Human Resource Development etc.

- **Investment of funds**

The cash assets available with ARAI have been invested in Scheduled Banks / Financial Institutions in various Deposit Schemes as per Government guidelines and Savings Bank Accounts.

- **DHI Supported Projects**

Projects approved by the Cess Committee are funded by Department of Heavy Industry (DHI), Ministry of Heavy Industries & Public Enterprises (MHI&PE), Government of India; out of Automobile Cess funds and projects approved by DHI's Project Implementation and Sanctioning Committee (PISC) under FAME-India Scheme are Plan Projects. ARAI also has taken up R&D projects funded from its internal funds.

- **Appointment of Statutory Auditors**

M/s A.R. Sulakhe & Company, Chartered Accountants, Pune were appointed as Statutory Auditors for the year 2015-2016 in the Annual General Meeting held on 3rd September 2015.

- **Membership Subscription**

The total number of members of ARAI as on 31st March 2016 is 75 and the Annual Membership Subscription for the year under report is Rs. 416.87 lakh.

- **Recognition by DSIR**

The Department of Scientific & Industrial Research, Ministry of Science & Technology, Govt of India, has renewed recognition to ARAI as a Scientific and industrial Research Organisation (SIRO) for further period from April 2014 to March 2017.

- **Credit rating**

The rating on the bank facilities of ARAI has been reaffirmed at CRISIL A1 + (which corresponds to very strong degree of safety regarding timely payment of financial obligations).

- **Income tax**

The Central Board of Direct Taxes has approved ARAI for exemption purposes under sec. 35 (1) (ii) of the Income Tax Act, 1961 vide Notification No. 9/2007 (F.NO. 203/18/2005-ITA-II) dated 28-3-2007 effective 1-4-2004.

### Establishment of Inspection & Certification (I&C) Centres

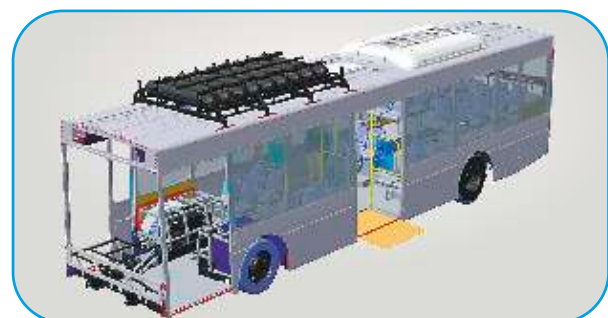
Ministry of Road Transport & Highways (MoRTH) initiated setting up of Model Test Centres in the country. ARAI is facilitating the project by establishing seven model centres, viz. Nasik - Maharashtra; Railmagra - Rajasthan; Olpad (Surat) - Gujarat; Nelamangala (Bengaluru) - Karnataka; Malkapur (Hyderabad) - Telangana; Cuttack - Odisha; and Trissur - Kerala.

### R&D Projects

R&D projects at ARAI are primarily internally funded or DHI supported. This year, three internally funded and two DHI supported projects were completed. Under one of these internal projects an electric vehicle has been built out of a conventional SCV. The other two projects were on noise control using statistical energy analysis methodology and development of a transmission for LCV application. The two DHI supported projects were on developing design guidelines for light weight city bus and study of material compatibility & emission performance with Ethanol blended Gasoline (E20). All these projects have helped in enhancing capabilities and technical know-how and in turn widened our service portfolio.



EV built out of Conventional SCV



Lightweight Bus with Aluminium Superstructure

The ongoing research projects are primarily for competency building in light weighting, electric vehicles technology, alternate powertrains and sub-systems development for vehicle safety. These include eight projects supported by DHI and seven projects funded internally by ARAI. The details of various projects (both completed and ongoing) are mentioned in the subsequent chapters of this report.

## Golden Jubilee Year Celebrations

ARAI is in the midst of a significant milestone as it celebrates the **Golden Jubilee Year**. Fifty years is a major achievement by any standards and when one looks at what has been achieved in this period, the team ARAI rightfully beams with a sense of pride. Over these years, we have grown from strength to strength to become the trusted partner of automotive fraternity. It has been a challenging and exciting journey that has enriched our customers.

Golden Jubilee Year Celebrations at ARAI commenced with launch of Golden Jubilee Year logo at the auspicious hands of Shri Devendra Fadnavis, Hon'ble Chief Minister, Government of Maharashtra on 3rd January 2016. Various events planned as part of these celebrations include guest lecture series by eminent personalities, young engineer award, series of publications, a short film competition on road safety, competitions for employees etc.

## ARAI – Homologation and Technology Centre (ARAI-HTC), Chakan

ARAI – Homologation and Technology Centre (ARAI-HTC) has been set-up under Government of India's National Automotive Testing and R&D Infrastructure Project (NATRIP). This centre is situated in Chakan near Pune, which is an industrial hub. Thus the new centre enjoys close proximity to end-users i.e., automotive and component manufacturers.

This centre was inaugurated on 4th January 2016 at the auspicious hands of Shri Anant Geete, Hon'ble Minister, Ministry of Heavy Industries & Public Enterprises, Government of India. The various laboratories established at this centre include Passive Safety Laboratory, Powertrain Laboratory, Fatigue & Materials Laboratory and EV/HEV test facilities under FAME-India. The details on various facilities in these laboratories are given in the subsequent chapters of this Annual Report.

## Business Development

- New services / processes / methodologies have been developed. Some of these are consultancy for establishment of vehicle emission test cell, evaluation of EV/HEV as per FAME guidelines, development of lightweight aluminium connecting rod, sound quality analysis of brake and clutch pedal assembly, multi-body simulation of engine governor mechanism & bus

lock assembly, measurement of tri-axial engine mount forces using Hexapod MAST, virtual simulation of vehicle fuel efficiency and CO<sub>2</sub> predictions in different driving cycles, laboratory fatigue testing of loader etc.

- Registration with Department of Infrastructure, Australia; to provide Type Approval Reports in compliance to ADRs (Australian Design Rules)
- Showcasing and demonstrating of ARAI's facilities and capabilities in design, development, testing and certification of automobiles & automotive components at eighteen domestic and four international exhibitions / seminars
- MoU with Fraunhofer Institute, Germany for 'Development of smart structures for automotive applications'
- MoU with Wheels India for 'Design and development of air suspension for rear axle of SUV pick-up vehicle'
- Collaboration with BWF-Esslingen, Germany for 'Metallurgical failure analysis'
- Collaboration with Indian Oil Corporation Limited – IOC (R&D) and Indian Institute of Petroleum (IIP) for 'Study of material compatibility with Ethanol blended Gasoline (E20)'
- Collaboration with CDAC Thiruvananthapuram, IIT Mumbai, and IISc Bengaluru for 'Development of off-line and real-time simulator for EV and HEV application'
- Collaboration with IIT Mumbai and Aluminium Association of India for 'Development of design guidelines for light weight city bus'

## Quality Management

- Compliance to following Standards was successfully demonstrated to Certification / Accreditation bodies:
  - o Recertification of ISO9001, ISO14001, OHSAS 18001 (including scope of Academy in IMS)
  - o NABL Desktop Audit for Testing & Calibration scope, Onsite Assessment of Fluid Flow scope and Assessment of new scope addition in Mechanical Testing, viz. Testing of Engines for off-road vehicle application
- Implementation of Web based Online Customer Feedback system

## Corporate Social Responsibility (CSR)

ARAI voluntarily started CSR initiative way back in 2008, earmarking 0.5% of previous year's surplus as financial support for CSR activities. This allocation was enhanced to 1% in 2013-14. This year, ten projects in the areas of Education, Health, Community Development and Swachh Bharat Abhiyan were supported under this initiative.



## Role in Standardization

### ROLE AND CONTRIBUTION IN VARIOUS NATIONAL AND INTERNATIONAL COMMITTEES / FORUMS

#### Automotive Industry Standards Committee (AISC)

- Technical Secretariat Services to AISC
- 3 meetings of AISC and several meetings of Technical Panels working under AISC held in 2015-16
- Contribution in formulation & implementation of several safety Standards, including Bus Body Code and Approval of Retro-fitment of Hybrid Electric System; and Roadmap for Series of Regulations for Construction Equipment Vehicles

#### CMVR - Technical Standing Committee

- Technical Secretariat Services to CMVR-TSC
- Chairmanship of Task Force for framing Bharat New Car Assessment Programme (Bharat NCAP) protocols and guidelines

#### Standing Committee on Implementation of Emission Legislations (SCoE)

- Technical Secretariat Services to SCoE
- Participated in 2 meetings of SCoE during the year 2015-16

#### CPCB Standing Committee

- Technical support to CPCB Standing Committee
- Contribution in formulation of standards on noise as a Member of National Committee

#### Bureau of Indian Standards (BIS)

- Technical guidance / expertise to BIS
- Chairmanship of 5 TED (Transport Engineering Department) Sectional Committees of BIS
- Participation in TED Sectional Committee meetings

#### WP. 29

- Technical Secretariat Services to National Committee on WP.29 matters and Core Group on WP.29 related activities
- 15 delegations sent under ARAI's leadership for Technical Sessions of WP.29 Working Parties and Informal Working Group meetings in 2015-16
- Coordinated WP.29 India sub-group activities on GRPE, GRB, GRRF GRE, GRSP, GRSG

## FORMULATION OF SAFETY STANDARDS



## NEW AIS, REVISED AIS AND AMENDMENTS TO EXISTING AIS PUBLISHED

New AIS	Revised AIS	Amendments to Existing AIS
<ul style="list-style-type: none"> <li>• Retro-fitment of Hybrid Electric Systems for M &amp; N Category vehicles with GVW &gt; 3.5 T</li> <li>• Electric Propulsion Kit for conversion of vehicles to Pure Electric operation</li> <li>• Adaptive Front Lighting Systems (AFS)</li> <li>• Light Emitting Diode (LED) light sources</li> <li>• Electronic Stability Control Systems (ESCS)</li> <li>• Product Identification and Numbering System for CEVs or Earth-moving Vehicles / Machinery</li> </ul>	<ul style="list-style-type: none"> <li>• Truck Body Code</li> <li>• CNG operated vehicles running on dual fuel (CNG-Diesel)</li> <li>• CMVR TA for Battery Operated Vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• TA and COP of Safety Components</li> <li>• Bus Body Code</li> <li>• School Buses</li> <li>• Child Restraint System</li> <li>• Wheel Rims for 2 and 3 wheeled vehicles</li> <li>• Pedestrian Safety</li> <li>• TA for Hybrid Electric Vehicles</li> <li>• Headlamp Beam Testing and Brake Testing at I&amp;C Centres</li> </ul>

### AIS Finalized

Specific constructional requirements for Sleeper Coaches

### Amendments to AIS Finalized

- AIS-007 (Rev.5) - Technical Specifications to be submitted by vehicle manufacturer
- AIS-008 (Rev.1) - Installation of lighting and light-signaling devices for 4 wheeled vehicles
- AIS-010 (Part 3) (Rev.1) - Light-signalling devices for L Category vehicles
- AIS-053 - Automotive Vehicles - Types – Terminology
- AIS-130 - Light Emitting Diode (LED) light sources
- Crash Standards: AIS-096 - Head-on Collision, AIS-098 - Offset Frontal Collision, AIS-099 - Lateral Collision
- AIS-123 - Retrofitted Hybrid Electric System

## AIS Under Finalization

- Fire detection and alarm system (FDAS) & fire detection and suppression systems (FDSS) for buses
- Specific Requirements for Double Deck Buses
- Electric Vehicle conductive AC charging system

## AIS Under Revision

- Type Approval and Certification procedure of Vehicles and Agricultural Tractors for compliance to CMVR
- Procedure for Conformity of Production of Agricultural Tractors for compliance to CMVR

## Amendments to Existing AIS Under Finalization

- Installation of lighting and light-signaling devices for 4-W
- Rear Marking Plates
- Retro-Reflective Markings
- Automotive vehicles - Type - Terminology
- Speed Limiting Devices
- Vehicle Alarm System
- Type Approval and CoP of components
- Truck Body Code
- Crash Standards
- Type Approval and Certification of vehicles for compliance to CMVR
- 3-W occupants safety measures

## COOPERATION WITH BUREAU OF INDIAN STANDARDS (BIS)

Chairmanship of following TED Sectional Committees:

- TED 2: Automotive Prime Movers, Transmission Systems and Internal Combustion Engines
- TED 6: Automotive Body, Chassis, Accessories, Garage Equipment, Springs and Suspension systems
- TED 22: Transport Tractors, Trailers and Industrial Trucks
- TED 26: Automotive Vehicles Running on Non-Conventional Energy Sources.
- TED 29: Passive Safety Crash Protection Systems



## CMVR AND IT'S IMPLEMENTATION

Subjects of national importance identified for formulation of Policy / Norms / Standards and their implementation:

- Bus Body Code and Truck Body Code
- Detailed specifications document for Vehicle Tracking Devices (GPS) and CCTV Devices
- Approval of Hybrid Electric System Intended for Retro-fitment on vehicles of M and N category having GVW > 3500 kg
- Approval of Electric Propulsion Kit Intended for Conversion of Vehicles for Pure Electric operation
- Specific requirements for Double Deck Buses
- CMV Rules for approval of Airport Passenger Buses (Tarmac Coaches)

## INTERNATIONAL COOPERATION AND HARMONIZATION OF NATIONAL STANDARDS

India became signatory to 1998 Agreement under UN ECE as part of our commitment to harmonization of automotive regulations. Under this agreement Global Technical Regulations (GTRs) are being formulated. During this year, India has voted in favour of following documents. Further, as a second step, action has been initiated in Automotive Industry Standards Committee (AISC) to transpose GTRs, which India has voted in favour, into our national standards.

- New Mutual Resolution No. 2 (M.R.2) containing Vehicle Propulsion System
- 9 technical subjects to be listed in the Compendium of Candidates for UN GTRs:
  - ◆ Heavy-Duty Engine, Vehicle Standards and Highway Diesel Fuel Sulfur Control
  - ◆ Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements
  - ◆ Control of Emissions of Air Pollution from non-road Diesel Engines and Fuel
  - ◆ Lamps, Reflective devices and associated equipment & its appended documentation
  - ◆ Passenger Car Braking Systems and its appended documentation
  - ◆ New Pneumatic Radial Tires for Light Vehicles and its appended documentation
  - ◆ Child Restraint and its appended documentation
- **Highlights of India's Participation in Technical Sessions of WP.29**
  - ◆ 1998 Agreement: WP.29 discusses monitoring of 1998 Agreement and transposition of UN GTRs and their amendments into Contracting Parties' (CPs) national / regional law. "Trilateral White Paper on Improvement in the Implementation of the 1998 Global Agreement" jointly presented by European Union, Japan and USA is under discussion in WP.29 sessions. The purpose of this paper is to provide framework through which Contracting Parties (CPs) can examine the experience of 1998 Agreement and agree on ideas and processes for improvement in its

implementation. Highlights of India's views presented on above in 166th Session of WP.29 held in June 2015 are given below:

- India would be pleased to share any data or experiences, especially in the area of WLTP
- Due to resource limitations, participation in all working groups was difficult, and a detailed survey assessing priority areas, focus and resource allocation of CPs might be worthwhile
- India would be ready to assist in this effort
- ◆ WP.29-164-25: India's presentation "Driving India into the Future" on NATRIP Project
- ◆ GRB-62-18: India's concerns regarding proposed new test procedure in UN R 28: Audible warning devices
- ◆ GRSG-108-39: India's comments on UN R 39 (Approval of speedometer) – Belgium had proposed to insert new provisions on installation of odometers. Experts from Fédération Internationale de l'Automobile (FIA) had proposed further amendments on this document with respect to modification in definition, maximum value of display, tolerance for mileage displayed etc. India recommended that modifications suggested by FIA need not be considered giving appropriate justifications.
- ◆ GRSG-108-40: India's comments on UN R 58 (Rear Underrun Protection) – Germany had proposed to introduce more stringent requirements for rear underrun protection devices related to impact form, lowering of RUPD mounting height, increasing width of devices and extending application to other categories of vehicle. India has submitted document seeking clarification with respect to applicability to certain categories of vehicles and their GVW.
- ◆ GRSG-108-41: India's comments on UN R 34 (Approval of vehicles with regard to prevention of fire risk) – Japan had proposed amendments on

preventive measures for vehicles from fire under certain conditions in the event of rear collision. Japan had proposed application of this regulation to M1 and N1 category vehicles having GVW up to 2.8 T. India proposed that UN R 34 applicability should be to M1, N1 vehicles below 2.5 T instead of 2.8 T as proposed so as to align and maintain weight uniformity with other EU and Indian crash regulations for M1, N1 category vehicles.

discussions and also, witnessed actual tests conducted in July 2015 at National Institute of Environmental Research, Korea. Further to this, ARAI has presented India's stand on WLTP Phase 2 items, which were discussed and finalized, with consensus among CP's including Japan, Europe, Korea and China. Subsequent to this, formation of new task force groups has been agreed upon to work up on new GTR's on evaporative emissions, OBD, in-service compliance, durability and supplementary tests.



72nd Session of GRPE



India's Participation in WLTP International Round Robin Programme

- Worldwide Harmonized Light Vehicles Test Procedure (WLTP)**

ARAI has participated as a part of Indian team, in 10th and 12th meetings of WLTP Informal Working Group held at Stockholm, Sweden during 2015-16. These meetings were for discussing and finalizing Phase 1(a) and Phase 1(b) items, based on which amendment to GTR No. 15 was adopted in 72nd GRPE session. India has also participated for the first time in international round robin test programme along with Indian technology vehicle to assess GTR No. 15 and test procedures. ARAI has been the coordinator from Indian side for round robin test program activities and logistic support. The participating countries in this program included Japan, Korea & China; and will further involve exchange of vehicle between Asia and Europe round. In this context, ARAI has participated in

- Environmental and Propulsion Performance Requirements (EPPR) for L – Category Vehicles**

EPPR is actively working in formulating of two new GTR's, viz. evaporative and crank case emissions; and OBD for L1 & L3 category vehicles. ARAI has participated in 12th, 14th & 15th Sessions of Informal Group on Environmental and Propulsion Performance Requirements (EPPR) of L Category vehicles, during which a number of Indian proposals were presented. These were considered after deliberations among CP's to adopt in EPPR group document. A new draft GTR on evaporative and crank case emissions for L1 & L3 vehicles was adopted in 72nd GRPE Session and this is expected to be endorsed in WP29's June 2016 session. Similarly, another new draft GTR on OBD is expected to be ready by 73rd Session of GRPE for its adoption.

## TYPE APPROVAL CERTIFICATION

Highlights of Safety Standards and Emission Norms implemented in 2015-16, notifications released for implementation in 2016-17 and notifications published in 2015-16 for future implementation are given below.

- Standards / Norms Implemented in 2015-16:



### Safety Standards

#### New Standards:

- Rear Marking Plates applicable to vehicle categories: N2 > 7.5 T, N3, T1, T2 and T3 > 8m, T4 and articulated busses
- Child Restraint System for non-transport M1 category of vehicles
- New provisions for requirements of Anti-Lock Braking Systems (ABS) for new and existing models of M3 and N3 category vehicles
- Approval of Modular Hydraulic Trailers
- New provisions for approval of Combined Harvesters
- Bus Body Code for existing models
- Approval procedure for Electric Vehicles and Hybrid Electric Vehicles introduced in market for pilot / demonstration projects intended for Government Scheme
- Electromagnetic Compatibility (EMC) for L category (existing models) and BS IV compliant M and N category vehicles
- Fitment of speed governor (speed limiting device or speed limiting function) on certain category of transport vehicles
- Maximum safe axle weight – 2 axle passenger vehicles with air suspension
- Agricultural Tractors: Windscreen Wiping System, Tractor Identification Number (TIN), Fuel Tanks, Maximum Design Speed

#### Revised:

- IS on calibration of speedometer for new models of 2, 3 and 4 wheeled vehicles and CEVs
- Agricultural Tractors: Driver perceived noise and pass by noise levels, filament lamps, brake hose

#### Others:

- Provisions for requirements of Automatic Wear Adjustments for braking systems extended to all 4 wheeled vehicles
- Indian Standards on safety components for vehicles running on CNG
- MoRTH advisory exempting vehicles having maximum design speed < 30 kmph from provisions related to speedometer



### Emission Norms

- Mass emission standards for flex-fuel ethanol (E85) and ethanol (ED 95) vehicles
- Revised test procedure for free acceleration smoke measurement for diesel vehicles
- Permitting Bio-CNG for motor vehicles as an alternate composition of CNG and emission norms
- Mass emission norms Bharat Stage IV (BS IV) for 4 wheelers for additional cities

• **Notifications for Implementation in 2016-17:**



## Safety Standards

### New Standards:

- Driver of M1 non-transport vehicle to ensure that child up to age of twelve years must be seated in an appropriate child restraint system conforming to AIS-072
- Fitment of speed governor (speed limiting device or speed limiting function) on N1 and M2 category vehicles
- Automotive Trailer Code as per AIS-113
- Requirements of Mechanical Coupling Components of combinations of vehicles as per AIS-091 (Part 1)
- Approval of Close-Coupling Device (CCD) and vehicles of N2, N3, T3 and T4, if fitted with such devices
- Requirements of wheel rims fitted on trailers and semi-trailers
- Product Identification Number for CEVs
- Provisions for braking systems for agricultural tractor-trailer combination
- Safety norms regarding transportation of live stock
- Test procedure for measurement of minimum ground clearance for M1 category of vehicles

### Revised:

- Revised IS on calibration of speedometer for existing models of 2, 3 and 4 wheeled vehicles
- Norms on location, identification and operation of Controls, Tell-tales and Indicators of 2W
- Electric Power Train Vehicles on Construction and Functional Safety Requirements, Measurement of Electrical Energy Consumption, Method of Measuring Range and Measurement of Net Power and Maximum 30 minute power
- Spray Suppression Devices for N and T category vehicles for new models

### Others:

- Indian Standard in place of AIS on interior noise for M2, M3, N2, N3 category of vehicles
- Indian Standard in place of AIS on requirements for Bumpers for M1 category of vehicles



## Emission Norms

- Mass emission norms Bharat Stage IV (BS IV) for 4 wheelers for additional cities and states
- Mass emission norms Bharat Stage IV (BS IV) for new models of 2 wheelers
- Mass emission norms Bharat Stage IV (BS IV) for new models of 3 wheelers
- New emission and noise norms for gensets running on dedicated Natural Gas (NG)/LPG/bi-fuel/dual fuel

• **Notifications Published in 2015-16 for Future Implementation:**



## Safety Standards

### New Standards:

- MoRTH advisory RT-11021/10/2014 – MVL dt 21/12/2015: All OEM to comply with directions of NGT regarding declaring values of emission, pass by noise, horn noise in their marketing leaflets
- Protective devices against unauthorized use for M and N category vehicles
- Vehicle alarm system and/or immobilizers, if fitted, on 4 wheeled motor vehicles
- Automatic Headlamp ON (AHO) for 2 wheelers
- Crash standards: Head-on collision, offset frontal collision, lateral collision and pedestrian safety
- Fitment of Anti-Lock Braking System (ABS) and Combined Braking System (CBS) on 2 wheelers
- Draft rules for approval of retro-fitment of Hybrid Electric Kit & Electric Conversion of Vehicles
- Draft rules for declaring values of emission, pass by noise, horn noise in Form 22 by manufacturer or registered E-rickshaw or E-cart Association in case of e-rickshaw or e-cart
- Draft rules for maximum dimensions of box which may be fitted on a motor cycle for carriage of any items
- Draft rules for Type Approval of Special Purpose Vehicles - Road Ambulances as per AIS-125 (Part 1) and Motor Caravan as per AIS-124

### Revised:

- Provisions for external projections for M1 category vehicles
- Norms on location, identification and operation of Controls, Tell-tales and Indicators of 2 wheelers existing models
- Standard on Spray Suppression Devices for N and T category vehicles existing models



## Emission Norms

- Mass emission norms Bharat Stage IV (BS IV) for existing models of 2 wheelers
- Mass emission norms Bharat Stage IV (BS IV) for existing models of 3 wheelers
- Mass emission norms Bharat Stage IV (BS IV) for 4 wheelers for pan India
- Draft rules for Average Fuel Consumption Standard for M1 <3.5 T and Fuel Economy Star Rating label
- Draft rules for Mass Emission Standards for bio-diesel (B 100)
- Draft rules for Mass Emission Norms - Bharat Stage VI (BS VI) for 2, 3 and M and N category vehicles



## Corporate Social Responsibility (CSR)

ARAI had taken up Corporate Social Responsibility (CSR) initiative voluntarily in 2008. ARAI had been earmarking 0.5% of its previous financial year's surplus for CSR activities, which was subsequently enhanced to 1% in Financial Year 2013-14.

As part of this initiative, ARAI provides financial support for projects undertaken by organizations engaged in empowerment of underprivileged, specifically in the areas of environment, education and health. This year two more areas, viz. 'Community Development' and 'Swachh Bharat Abhiyan' were added to widen CSR activity. During the year, following ten projects were supported under CSR initiative.

### EDUCATION:

- An orphanage school, 'Aamcha Ghar' in Thane district, has been provided with school furniture and science lab material. This orphanage provides education and vocational training to children of financially weak families.
- Indian Institute of Entrepreneurship Development & Research' (IIEDR), a Pune based NGO has been supported financially for procurement of computers. This NGO is engaged in creating sustainable impact on rural poverty by skilling rural youth.
- Financial assistance for DG Set procurement to 'SAMPARC Sanstha', based in Pune district, which works for rehabilitation, care and education of orphan / street / poor children.
- Assistance for Web Site-cum-Portal Development provided to 'Shyam Chi Aai Foundation'. This NGO is on the State Committee for creating a framework for career counselling in Maharashtra. It supports needy students from corporation schools / poor families / slums with vocational education scholarships.
- LCD Projector with accessories provided to 'Swami Vivekananda Balak Seva Sangh' an institute working for the development of children (of 8 to 15 years age group) residing in slums.

### HEALTH:

- Assistance for procurement of Computers and Refrigerator to Pune based NGO, 'Sahara Alhad', working for marginalized people affected by HIV/AIDS, TB and Drug abuse.
- Financial assistance for 'Cancer Patients Aid Association' (CPAA-Pune) for purchase of cancer medicines for needy and poor patients suffering from cancer.

### COMMUNITY DEVELOPMENT:

- Financial assistance for 'KT-Weir' (small dam project) implemented by 'Sevavardhini Sanstha' at Vangani Village, Velhe Taluka, Pune District. This has helped the farmers in storing rain water.

### SWACHH BHARAT ABHIYAN:

- A project on toilets renovation to ensure proper sanitation and hygienic environment for students at The New High School in Kolhapur District has been supported as part of 'Swachh Bharat Abhiyan' mission of Government of India. This school has been adopted by Mumbai based NGO 'Matoshree Sevadham Arogya Seva Trust', which provides education to children of poor farmers.
- Assistance has been provided to a Mumbai based NGO, 'Akshara Samajik Pratishthan' engaged in educating children from tribal areas, for their project on reconstruction and repairs of school toilets for maintaining hygienic environment under 'Swachh Bharat Abhiyan'.



KT-Weir Project for Water Conservation

## Technology / Research Publications

- 'Glare study of unbound headlamp leveling in motorcycles' by B. V. Shamsundara, V. S. Bhagat & M. Siva in June 2015 at The International Forum on Automotive Lighting (IFAL), Shanghai, China
- 'Various Parameters affecting the Acoustical Performance of Firewall Studied using experimental techniques' by S.K. Jain, Manasi Joshi & N. V. Karanth in July 2015 at ICSV22, Florence, Italy
- 'Deliver Exponential Benefits using Virtual Product Engineering (VPE)' by N. V. Karanth in September 2015 at ESI India User Forum 2015, Pune
- 'SEA Simulation and Validation of Sound Transmission Loss of Single and double Glaze Partition System measured in Reverberation Room' S.K. Jain, Manasi Joshi & N. V. Karanth in October 2015 at National Symposium on Acoustics-2015, Goa
- 'Integrated Approach of Prediction and Validation of Mechanical Fuel Injection System Characteristics for A Single Cylinder Diesel Engine by Using Simulation Tool' by P. G.Bhat, Dr. S. S. Thipse, N. V. Marathe & N. V. Pawar published in October 2015 in Journal of Basic and Applied Research International Knowledge Press
- 'Use of Forging Simulation for Development of Aluminium Wheel Rim for Automotive Application', published January 2016 in Aluminium Association of India Journal, Vol. 15, Issue No - 4
- 'Virtual Approach of Up gradation of a Two Cylinder Naturally Aspirated Diesel Engine to Turbocharged Intercooled Configuration for Meeting Stringent Emission Limits' by P. G.Bhat, Dr. S. S. Thipse, N. V. Marathe & N. V. Pawar published in February 2016 at 9th International Mobility Conference, New Delhi
- 'Prediction of Thermal Comfort Inside a Midibus Passenger Cabin Using CFD and Its Experimental Validation' by K. D. Udawant in February, 2016 at CEI India Conference, Bangalore
- 'Analysis of EGR Mixing using 1D-3D Coupling' by H. B. Chaudhari & Y. S. Patil in February 2016 at CEI User Conference, Pune
- 'Combustion hardware selection using virtual techniques' by Alen Jose in February 2016 at CEI User Conference, Pune
- 'Optimization of parameters for the production of biodiesel from Jatropha Oil' by Aatmesh Jain, Vinod S. Sherekar & Dr. K. C. Vora in February 2016 at SIIMC 2016, New Delhi
- 'Anti-Pinch Mechanism for Power Window' by Nithin Alex John, Mona Sherki & Sanjay A Patil in February 2016 at SIIMC 2016, New Delhi
- 'Design and Development of Tunable Exhaust Muffler for Race Car' by Sankalp Talegaonkar, Mohammad Rafiq B. Agrewale & Dr. K. C. Vora in February 2016 at SIIMC 2016, New Delhi
- 'Tactile Sensor Array Design for Triple Seat Detection & Control' by Eeshan Bashir & Sanjay A Patil in February 2016 at SIIMC 2016, New Delhi
- 'Implementation of Fuzzy Logic Control in Semiactive Suspension for a Vehicle using MATLAB SIMULINK' by Shraddhesh Rasal, Jayanth Jaganmohan, Sohan Agashe & Kiran P. Wani in February 2016 at SIIMC 2016, New Delhi
- 'Applications of residual stress quantification for finding root cause of failures in Metallurgical Failure Analysis on Automotive Components' by P. B. Deshmukh & B. Satish in February 2016 at Materials & Manufacturing Technology, Pune
- 'Shaft Forging Process Design and Effect of Process Parameter on End Properties' by P. K. Ajeet Babu, M. R. Saraf, Suraj Mani Chaurasiya & Suhail M. Mulla of ARAI and Kaustubh Kulkarni & Shashank Shekhar of IIT, Kanpur in February 2016 at SIMPRO, Ranchi
- 'Use of Institutional Repository for Information Dissemination and Knowledge Management' by Dr. A. Madhava Rao, Dr. K. C. Vora & Y. S. Thipse in March 2016 at 61st ILA International Conference on Sustaining The Excellence: Transforming Libraries Through Technology, Innovation And Value Added Services In Google Era, Rajkot

## Events



President ARAI welcoming Shri Anant Geete, Hon'ble Minister for Heavy Industries & Public Enterprises, Government of India at the Inaugural Function of ARAI – HTC, Chakan

### Inauguration of Chakan Facilities

ARAI's facilities are undergoing comprehensive upgradation under NATRiP to match with the global peers. These facilities are being developed at Chakan as Centres of Excellence in Powertrain; and Fatigue & Materials; in addition to Homologation facilities for Passive Safety, including full vehicle crash systems. This new centre, now known as ARAI – Homologation and Technology Centre (ARAI – HTC), has state-of-the-art crash test facilities. This centre was inaugurated on 4th January 2016 at the auspicious hands of Shri Anant Geete, Hon'ble Minister, Ministry of Heavy Industries & Public Enterprises, Government of India and in the presence of Shri Shivajirao Adhalrao Patil, Hon'ble Member of Parliament and esteemed guests from Government of India and automotive fraternity. This centre will also have EV / HEV test facilities being established under Government of India's FAME-India initiative.

### Launch of Golden Jubilee Year Celebrations

Starting off in 1966 on a modest note, ARAI has transformed to a renowned global R&D and Testing institute. Over these years, ARAI has continuously demonstrated its ability to capitalize quickly and decisively to changing market dynamics and technologies. This attribute has helped ARAI to evolve, grow and more importantly, launch itself in the global platform. ARAI is now celebrating its 50<sup>th</sup> year of its existence and so, to commemorate this significant milestone Golden Jubilee Year Celebrations were launched with unveiling of Golden Jubilee Year logo on 3<sup>rd</sup> January 2016 at the auspicious hands of Shri Devendra Fadnavis, Hon'ble Chief Minister, Government of Maharashtra and in the presence of Dr. K. Sivan, Director, Vikram Sarabhai Space Centre (VSSC), ISRO Thiruvananthapuram and dignitaries from the automotive industry. Various events are planned as part of these celebrations, which include guest lecture series by eminent personalities, young engineer award, series of publications, a short film competition on road safety, competitions for employees etc.



Launch of Golden Jubilee Year Celebrations at the auspicious hands of Shri Devendra Fadnavis, Hon'ble Chief Minister, Government of Maharashtra

## 10<sup>th</sup> India Day at Frankfurt

10<sup>th</sup> India Day was organized by IAA, Germany, in Frankfurt, during 17<sup>th</sup> to 27<sup>th</sup> September 2015. Indian delegation, under the leadership of Shri Anant Geete, Hon'ble Minister, for Heavy Industries & Public Enterprises, Government of India; participated in it. Both countries exchanged views about the possible cooperation in the areas of joint research, export homologation, technology deployment and skill development.

Director, ARAI presented progress of Indian auto industry and forthcoming regulations on emission and safety.



Indian Delegation under Shri Anant Geete, Hon'ble Minister for Heavy Industries & Public Enterprises, Government of India at 10<sup>th</sup> India Day held in Frankfurt

## Upcoming Event: SIAT 2017



■ SIAT 2017 ■ 18-21 January 2017

■ SIAT EXPO 2017 ■ 18-21 January 2017

Venue : ARAI Campus, Pune, INDIA

Organized by  
**ARAI**  
Progress through Research  
The Automotive Research Association of India

In Association with  
**SAE** **SACINDIA** **NATRIP**

**Symposium on International Automotive Technology 2017**  
Smart, Safe & Sustainable Mobility

'Symposium on International Automotive Technology' (SIAT) is a benchmark event organized by ARAI biennially. SIAT serves as an important forum for exchange of ideas and brainstorming for the automotive industry. Over the years, it has grown in stature and is now considered as a prestigious event marked by presence of global automotive fraternity.

Fifteenth edition of 'Symposium on International Automotive Technology' (SIAT 2017) will be organized by ARAI in association with SAEINDIA, NATRiP and SAE International at ARAI, Pune during 18 – 21 January 2017. This edition of SIAT will be a memorable one as it will serve as grand finale of ARAI's Golden Jubilee Year Celebrations.

The theme of this edition is 'Smart, Safe and Sustainable Mobility', which is very much apt as it is in tune with latest trends and future challenges in the mobility sector. Also, focus of Government of India for reducing air pollution, encouraging electric mobility coupled with thrust on reducing road accidents and fatalities through smart and

intelligent solutions has driven industry to advance their R&D efforts. SIAT 2017, happening in this backdrop, will be an ideal platform for the researchers around the globe to put forth and deliberate their ideas to address India specific and global challenges facing the automotive sector.

This edition of SIAT will focus on recent advances in various automotive areas such as Safety, Emissions, Engines, Noise, Electric Mobility, Alternate Fuels, Electronics, Intelligent Transportation, Structural Reliability & Vehicle Dynamics, Materials, Simulation & Modelling, Global Regulations, etc. SIAT EXPO 2017 being organized concurrently, will offer appropriate platform to automotive and allied companies to display their products / technologies / innovation / services through various stalls.

Convener of SIAT 2017 is Mr. Anand Deshpande, Deputy Director and Mr. Vikram Shinde, General Manager is the Coordinator for SIAT EXPO 2017. Detailed information on the symposium and exposition is available at <http://siat.araiindia.com> or can be obtained by contacting Convener, SIAT 2017 at [siat2017@araiindia.com](mailto:siat2017@araiindia.com)

## Supporting SAEINDIA Activities

ARAI is associated with SAEINDIA's wide spectrum of activities carried out for the benefit of practicing engineers, engineering students and school children. SAEINDIA Western Section (SAEI WS) organizes training and educational programmes, workshops and knowledge dissemination activities for enhancing human resource skills to meet the growing industry requirements.

### • Lectures / Workshops

- ◆ Eminent Speaker Series (ESS) Lecture by Mr. Vinay Mundada on '100 Years of Indian Automotive Industry' was organized at ARAI. The lecture was attended by over 90 members from Industry and Academia and was well appreciated.
- ◆ One day workshop on 'Evolution of Emission Control in India : From BS I to BS VI' was jointly organized by ARAI and SAEINDIA WS at ARAI, wherein 30 delegates participated and benefited.
- ◆ Two day workshop on 'Advanced Exhaust After-Treatment & Simulation' was jointly organized by ARAI, SAEI WS, Exothermia & Trinity Simulations at ARAI, which saw a participation of more than 50 members.

- During the year, ARAI sponsored and supported SAEINDIA's activities like AWIM (A World in Motion), BAJA, SUPRA and SAEINDIA Off-Highway Board activities.
  - ◆ BAJA SAEINDIA 2016 was held from 18th to 23rd February 2016 at the NATRAX facility of NATRiP in Pithampur, Indore. It comprised of virtual BAJA, technical scrutiny, student workshops, faculty workshop, design / cost report submission, etc. The event witnessed a participation from 395 teams from across India. In its virtual round 154 teams qualified for Main BAJA and 12 teams qualified for e-BAJA. This event was followed by the prestigious HR meet, a platform for the participating companies to recruit the best of talent from the pool of BAJA participants.
  - ◆ AWIM Pune Olympics 2015 – A World In Motion (AWIM) competition for school children of 5th & 6th Standard was held on 5th December, 2015 at The Orchid School, Pune. The event was a grand success with participation of over 224 students from 18 different schools, contesting and displaying their knowledge and skills. The winner of AWIM Pune Olympics 2015 participated in AWIM National Olympics held during 22nd to 24th January 2016 at Mahindra Research Valley at Chengalpattu, Chennai.



Eminent Speaker Series Lecture by Mr. Vinay Mundada



Workshop on Evolution of Emission from BS I to BS VI



BAJA 2016 Inauguration



BAJA 2016 Endurance Event

- ◆ Student Industry Education (SINE), organized by SAEINDIA Off-Highway Board, is an event for Women Student Engineers in which 25 students from all over India are selected for industry interaction in and around Pune. The event includes students visiting ARAI's facilities for a day.
- ◆ SAEINDIA Western Section's Annual Social 2015 was hosted by ARAI and had an attendance of over 200 members from industry and academia. Dr. Richard Greaves, President SAE International and Mrs. Rashmi Urdhwarshre, Chairperson,

SAEINDIA Western Section felicitated the western region winners of Project Competition, Supra 2015 & BAJA 2015. During this event, students and faculty members of Vishwakarma Institute of Technology (VIT) organized cultural performances, which included Sand Art, Magnet Art, Upside-down Painting, Wax Painting, Ibru Art 2 and Odissi Dance.



School Children at AWIM Event



SAEI WS Annual Social 2015

## ARAI - In the 'Words of Important Dignitaries'

13th July 2015

*"Impressed by the state-of-the-art facilities established and coming up here and the professionalism and dedication of the Director and ARAI Staff, which together make ARAI a class institution. Keep it up!"*

Dr. Rajan Katoch  
Secretary (HI), Government of India



4th November 2015

*"You have proved to be Master in Automobile Technology Development. Good wishes for Bright Future. State Government is always with you."*

Shri Diwakar N Raote,  
Hon'ble Cabinet Minister, Government of Maharashtra



3rd January 2016

*"It is a proud privilege to kick-start the Golden Jubilee Celebration of ARAI. It has assumed a position of a premier Institution in Automotive Sector. Starting as a humble testing facility now it is a Lab of Innovations. My best wishes for future."*

Shri Devendra Fadnavis,  
Hon'ble Chief Minister of Maharashtra



27th February 2016

*"I could get clear idea about ARAI's work today. Various types of research activities and testing of vehicles are carried out here. While using the vehicle we do not know that it has to undergo so many tests. I appreciate knowledge and persistence of all the Officers of ARAI. My best wishes to ARAI for its activities."*

Smt Medha Kulkarni, Hon'ble Member of Legislative  
Assembly, Maharashtra State



## Knowledge Centre

ARAI provides skill development programmes through its Knowledge Centre. They include training, educational programmes and knowledge dissemination activities for skill development of automotive industry personnel and academia. These activities are carried out through Learning Centre, Training Centre & Library.

### Learning Centre

Learning Centre conducts undergraduate, postgraduate and doctorate programmes, with specialization in Automotive Engineering through collaborations with various universities. It has tie-ups with VIT University (Vellore), VEL TECH University (Chennai), College of

Engineering (Pune), University of Alabama (USA), Tennessee Tech University (USA), Loughborough University (UK) and Technical University of Braunschweig (Germany). Brief summary of the joint programmes conducted is given below.

<p><b>VIT University, Vellore</b></p>	<ul style="list-style-type: none"> <li>• Ph.D. in Automotive Engineering</li> <li>• M. Tech. with specialization in Automotive Engineering</li> <li>• M. Tech. for Industry Professionals with specialization in Engine Technology, Powertrain Electronics and Manufacturing &amp; Industrial Electronics</li> <li>• B. Tech. in Mechanical Engineering with specialization in Automotive Engineering</li> </ul>
<p><b>VELTECH University, Chennai</b></p>	<ul style="list-style-type: none"> <li>• M. Tech. in IC Engines</li> <li>• M. Tech. in Electronics Engineering with specialization in Automotive Electronics</li> </ul>
<p><b>College of Engineering, Pune</b></p>	<ul style="list-style-type: none"> <li>• M. Tech. in Automotive Technology</li> </ul>
<p><b>University of Alabama, Birmingham, USA</b></p>	<ul style="list-style-type: none"> <li>• M. S. in Mechanical Engineering with Automotive Engineering emphasis</li> </ul>

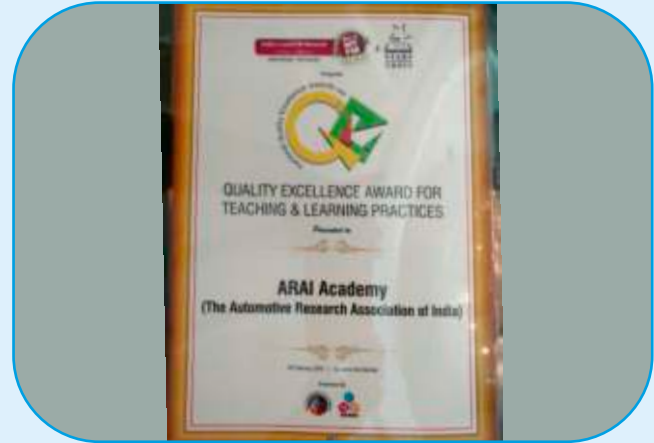
Prominent highlights of the year:

- MoU with Cummins India for deputing their engineers for M. Tech. Programme in Manufacturing & Industrial Engineering (conducted jointly by ARAI with VIT University)
- MoU renewed with University of Alabama, Birmingham USA for academic collaborations
- MoU with Robert Bosch Engineering India Pvt. Ltd., Bengaluru for joint development & strategic alliance for Development of E-Modules
- Concept of Four-Board Teaching (FBT) devised successfully and implemented across all academic programmes. Paper would be presented in September 2016 at FISITA2016, Korea
- Convocation ceremony of M. Tech. Programme for Industry Professionals held at ARAI
- First Batch of 16 industry professionals from Cummins joined M. Tech in Manufacturing & Industry Engineering programme
- Second batch of 12 and fifth batch of 34 industry professionals from Eaton, Tata Motors, Cummins, Woodward India Pvt. Ltd., Ashok Leyland, M&M, Magna Steyr joined M. Tech in Powertrain Electronics and Engine Technology programmes
- Student Innovation Award given by CII to Academy students at Auto Expo 2016
- Academy students bagged third place at 'Parivartan 2016', a Model Making Competition in Pune
- Sports Tournaments like Chess, Carom, Table Tennis, Football, Volleyball & Cricket were conducted for Academy students.





MoU renewal with University of Alabama, Birmingham, USA for Academic Collaborations



Quality Excellence Award in Teaching & Learning Practices

## Library

ARAI Knowledge Centre's library has a rich collection of references of about 14,000 in print and digital format with respect to automotive and related subjects. It serves the employees, academy students and library members from industry, academia and student community. In 2015-16, 138 books & 45 standards were added to its collection. Also, 36 journals, 12 e-books from Elsevier publisher, SAE Digital Library, SANS standards from South African Bureau of Standards and selected sections of BIS Standards were subscribed to. Over 11,000 professionals and students visited the library in 2015-16.

## Training Centre

This year, Training Centre organized 32 Proficiency Improvement Programmes (PIPs) & 3 Domain Training Programmes (DTPs) at ARAI, Kothrud, Pune and 13 PIPs at ARAI - FID, Chakan. These lectures were given by ARAI personnel, academicians and eminent industry experts, including speakers from abroad. These PIPs & DTPs had a participation of 1782 delegates. Some of the programmes are given below.

- Engine Electronics and Management
- Engine Design and Development
- Advanced Model Based Design
- Automotive Engineering & Homologation
- Automotive Functional Safety
- Fundamentals of Noise & Vibration
- Vehicle Dynamics & Structure
- Master Class on Modal Analysis
- Powertrain Engineering
- Automotive Engineering
- Thermodynamics Analysis of an I.C. Engine
- Applied Engineering Mathematics

- Embedded Systems Design
- Engine Testing & Certification
- Automotive Sensors & Actuators
- Automotive Fuels & Energy
- Systems Engineering
- Advanced Heat Transfer
- Regulation Driven Global Automotive Crashworthiness and Occupant Safety
- Transmission Control Systems
- Powertrain NVH
- Evolution of Emission Control in India: From BS I to BS VI
- Software Development Lifecycle Management
- Engine Emissions & Control
- Intelligent Transport Systems
- Advanced Fluid Mechanics
- Nitriding Processes & Vacuum Heat Treatment
- Advanced Exhaust After-treatment & Simulation
- Material Failure Modes & Analysis
- 5S and Kaizen Techniques
- Metallurgy for Non-Metallurgist
- Failure Mode and Effect Analysis
- Design of Experiments
- Basics and Advance Heat Treating
- Probability, Statistics & Operation Research
- Excellence through Quality
- Basics of Reliability Engineering
- Failure Analysis
- Advanced Optimization Methods
- Principles of Industrial Engineering
- Advanced Materials & Processing
- Domain Training Programmes on Failure Analysis of Engine & Engine Components, Engine Testing & Certification and Automotive Testing & Certification

## ARAI - Homologation and Technology Centre (ARAI - HTC), Chakan

ARAI's facilities are being upgraded and expanded under NATRiP at Chakan MIDC – Phase III. This upgradation is for establishing **Centres of Excellence in Powertrain; and Fatigue & Materials;** in addition to **Homologation facilities for Passive Safety**, including full vehicle crash systems. This new centre has been named as '**ARAI – Homologation and Technology Centre (ARAI – HTC), Chakan**'. It is in close proximity to end-users, i.e., automotive and auto component industry.

ARAI – HTC was inaugurated on 4th January 2016 at the auspicious hands of Shri Anant Geete, Hon'ble Minister for Heavy Industries & Public Enterprises, Government of India and in the presence of Shri Shivajirao Adhalrao Patil, Hon'ble Member of Parliament and esteemed guests from Government of India and automotive fraternity. This centre comprises of Passive Safety Laboratory, Powertrain Laboratory, Fatigue & Materials Laboratory and EV/HEV Test facilities.



Inauguration of ARAI – HTC, Chakan by Shri Anant Geete, Hon'ble Minister for Heavy Industries & Public Enterprises, Government of India



ARAI – Homologation & Technology Centre (ARAI – HTC), Chakan

### Passive Safety Laboratory – Homologation:

Passive Safety Laboratory has been established with test facilities for performance evaluation of sub-systems, systems and full vehicle under different accident conditions. These facilities are capable of providing homologation support as per upcoming crash regulations and proposed Bharat New Vehicles Safety Assessment Programme (BNVSAP), a safety star rating system for India. This lab is already operational and has started providing services to the customers. Some of the services available are given below.

- Crash tests like Full Frontal, Offset Frontal, Side Impact, Rear impact, airbag ECU calibration and component evaluation of frontal structure
- Seat testing as per IS 15546 / AIS 023 / ECE R17 / ECE R80
- Luggage retention test as per IS 15546 / ECE R17
- Tests for door locks and door retention components as per GTR 1 / ECE R11
- Child restraint system dynamic test as per AIS 072 / ECE R44
- Safety belt testing as per IS 15140 / ECE R16
- Determination of dynamically determined head impact zone as per IS 15223:2014 / ECE R21
- Child seat installation and GSR 291(E) certification

- Comprehensive facility for Pedestrian and Occupant protection testing as per national / international standards viz. AIS 100, ECE R127, GTR9, ECE R21, ECE R12, FMVSS 201 & 201(U), 203, 222, 226 and NCAPs



Crash Test Facility



Pedestrian Safety Test Facility

### Powertrain Laboratory - Centre of Excellence:

Powertrain laboratory is for testing of vehicles, engines & powertrains and other accessories for their performances with respect to power, efficiency, exhaust emissions etc. It consists of chassis dynamometers; controlling & measuring equipment; and instrumentation. The laboratory and test cells are climatically controlled and fitted with advanced systems for fire protection, telecommunication and data transfer for ensuring confidentiality. The laboratory is treated acoustically for control of noise pollution.

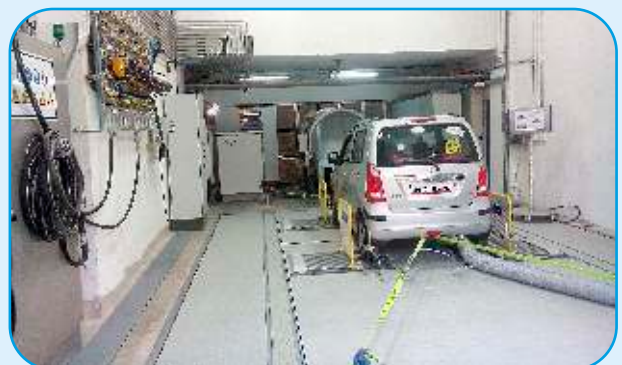
Equipment installation at this laboratory has been completed and commissioning is underway, except for Transmission & Gearbox Test Centre (TGTC), which has been held up due to issues with original contractor. NATIS is working on alternate mechanism to take this activity

further. The major facilities in this laboratory include:

- Climatic Vehicle Test Cell (CVTC) to test vehicles up to LCV category using 4 x 4 Chassis Dynamometer along with solar simulation (-30° C to 50° C)
- Climatic Soak Room of size 35 x 10 m (-30° C to 50° C)
- Vehicle Test Cell (VTC) to test vehicles up to LCV category using 4 x 4 Chassis Dynamometer with controlled climate with temperature
- Soak Room for above test cell with temperature of 25° C ± 3° C
- Mileage accumulation test cell with 4 x 4 Chassis Dynamometer for endurance testing with auto fuel refilling
- Test Cell for Transmission / Gear box performance testing
- Variable Volume / Variable Temperature (VV / VT), Sealed Housing for Evaporative Determination (SHED) area



CVTC



MACD

## Fatigue & Materials Laboratory – Centre of Excellence:

Fatigue & Materials laboratory is for prediction of structural failures & evaluation; and failure analysis of vehicular structural components; systems & sub systems; and chassis / full vehicle subjected to real life dynamic loading conditions. Equipment installation of hard-line and portal frames for universal test setup has been completed. The major work for environment control chamber for MAST and Drive in four Poster (DI4P) is in progress and is expected to

be completed shortly. Some of the equipment in this laboratory are given below.

- Four Poster with built in climatic chamber for vehicles up to SUV
- Four Poster durability evaluation for 2 wheeler, 3 wheeler and small 4 wheeler
- MAST (Multi Axis Simulation Table – Hexapod) along with Climatic Chamber
- Universal Test Benches for component evaluation



Four Poster Test System



Universal Test Benches

## Coming Up Soon EV / HEV Test Facilities under FAME-India

One of the key elements of successful implementation of the National Mission for Electric Mobility (NMEM) is establishment of test facilities for testing of electric and hybrid electric vehicles. As part of Government of India's FAME-India Scheme, state-of-the-art testing infrastructure for certification testing of electric and hybrid electric vehicles are being established at this centre. The major facilities in this laboratory will include:

- 100 kW Motor Test Bed
- 250 kW Motor Test Bed
- HCV Chassis Dynamometer with Emission Measurement System
- Battery Performance Test System
- 100 kW DC Power Supply, 450 V / 200 A
- 250 kW DC Power Supply, 800 V / 600 A



- Auditors' Report

- Annual Statement of Accounts

# THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

## Independent Auditors' Report

To

**The Members**

**The Automotive Research Association of India, Pune**

### 1. Report on Financial Statements

We have audited the accompanying financial statements of **The Automotive Research Association of India** ("the Association"), which comprise the Balance Sheet as at March 31, 2016, and the Income and Expenditure Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

### 2. Management's Responsibility for the Financial Statements

The Association's Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance of the Association in accordance with the Accounting Standards. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

### 3. Auditor's Responsibility

3.1 Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

3.2 An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Association's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances but not for the purpose of expressing an opinion on the effectiveness of the Association's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

3.3 We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### 4. Opinion

In our opinion and to the best of our information and according to the explanations given to us, the financial statements give a true and fair view in conformity with the accounting principles generally accepted in India:

- (a) in the case of the Balance Sheet, of the State of affairs of the Association as at March 31, 2016; and;
- (b) in the case of the Income and Expenditure Account, of Surplus for the year ended on that date.

**For A R Sulakhe & Co**  
**Chartered Accountants**  
Firm Registration No.110540W

**Place : Pune**

**J V Dhongde**  
**Partner**

**Dated : June 30, 2016**

Membership No. 37290

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Balance Sheet as on 31<sup>st</sup> March 2016

(Rs. in Lakhs)

PARTICULARS	SCH NO		AS ON 31-03-2016		AS ON 31-03-2015
<b>SOURCES OF FUNDS</b>					
<b>1. GENERAL &amp; OTHER FUNDS</b>					
A) GENERAL FUND	1	58807.98		51315.45	
B) R & D RESERVE FUND	2	22999.66		21646.96	
C) REPLACEMENT OF EQUIPMENT/ MACHINERY FUND	3	10514.72	92322.36	9433.63	82396.04
<b>2. PROJECT FUNDS (NET)</b>	4		4771.80		586.33
<b>3. CURRENT LIABILITIES AND PROVISIONS</b>	5		7210.21		6532.66
<b>TOTAL</b>			<b>104304.37</b>		<b>89515.03</b>
<b>APPLICATION OF FUNDS :</b>					
<b>1. FIXED ASSETS</b>	6		50675.87		44291.95
<b>2. CURRENT ASSETS, DEPOSITS AND ADVANCES</b>					
A) INVENTORIES	7(A)	29.21		43.12	
B) SUNDRY DEBTORS	7(B)	3492.14		3897.21	
C) DEPOSITS, CASH & BANK BALANCES	7(C)	48463.75		39832.33	
D) ADVANCES	7(D)	1040.42		1195.42	
E) SUNDRY DEPOSITS	7(E)	250.92	53276.44	255.00	45223.08
<b>3. DEFERRED REVENUE EXPENDITURE</b>			352.06		0.00
(to the extent not written off or adjusted)					
<b>TOTAL</b>			<b>104304.37</b>		<b>89515.03</b>
NOTES TO THE ACCOUNTS	13				

Mrs Rashmi Urdhwareshe  
Director

Rajan Wadhwa  
President

Vikram Kirloskar  
Vice President

AS PER OUR  
REPORT OF EVEN DATE  
FOR A.R. SULAKHE & COMP.  
CHARTERED ACCOUNTANTS  
F.R. NO. 110540W

J V DHONGDE  
PARTNER  
Membership No. 37290

Date: June 30, 2016  
Place: Pune

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Income and Expenditure Account for the Year Ended 31<sup>st</sup> March 2016

(Rs. in Lakhs)

PARTICULARS	SCH NO	YEAR ENDED 31-03-2016	YEAR ENDED 31-03-2015
<b>INCOME</b>			
SPONSORED PROJECTS, TESTING, LEARNING & TRAINING CENTRE	8	21114.65	18730.68
ANNUAL MEMBERSHIP SUBSCRIPTION	-	416.87	408.97
SIAT 2015	-	-	702.56
FUNDS TRANSFERRED FROM R&D RESERVE FUND	-	64.68	80.51
INTEREST	9	3865.64	3719.14
OTHER INCOME	10	337.64	132.80
<b>TOTAL</b>		<b>25799.48</b>	<b>23774.66</b>
<b>EXPENDITURE</b>			
SPONSORED PROJECTS, TESTING, LEARNING & TRAINING CENTRE EXPENSES	-	2265.33	2060.06
ARAI R&D PROJECTS	-	64.68	80.51
SALARIES & OTHER ALLOWANCES	11	9280.71	7985.65
EMPLOYEE RELATED EXPENSES	-	248.44	260.29
OPERATION & ESTABLISHMENT EXPENSES	12	2891.19	2384.94
DEPRECIATION	-	2608.24	2852.98
LESS: DEPRECIATION ON GOVT. FUNDED ASSETS		1132.95	1326.72
SIAT /GOLDEN JUBILEE EXPENSES	-	97.33	449.42
<b>EXCESS OF INCOME OVER EXPENDITURE</b>		<b>9476.51</b>	<b>9027.53</b>



## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Income and Expenditure Account for the Year Ended 31<sup>st</sup> March 2016

(Rs. in Lakhs)

PARTICULARS	SCH NO	YEAR ENDED 31-03-2016	YEAR ENDED 31-03-2015
<b>APPROPRIATION</b>			
A) INTEREST ON EARMARKED FUNDS TRANSFERRED TO RESPECTIVE FUNDS			
- R & D RESERVE FUND		1417.38	1604.82
- REPLACEMENT OF EQUIPMENT/ MACHINERY FUND		1081.09	2498.47
B) LEARNING CENTRE AND SIAT			
- SURPLUS (DEFICIT) OF SIAT 2015 TRANSFERRED TO GENERAL FUND		0.00	0.00
C) EXCESS OF INCOME OVER EXPENDITURE (NET)		<b>6978.04</b>	<b>6521.56</b>
<b>TOTAL</b>		<b>25799.48</b>	<b>23774.66</b>
NOTES TO THE ACCOUNTS	13		

**Mrs Rashmi Urdhwareshe**  
Director

**Rajan Wadhwa**  
President

**Vikram Kirloskar**  
Vice President

AS PER OUR  
REPORT OF EVEN DATE  
**FOR A.R. SULAKHE & COMP.**  
**CHARTERED ACCOUNTANTS**  
F.R. NO. 110540W

**J V DHONGDE**  
PARTNER  
Membership No. 37290

Date: June 30, 2016  
Place: Pune

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Statement of Receipts & Expenditure on Cess Projects

#### APPENDIX - I

(Rs. in Lakhs)

Sr. No.	NAME OF THE PROJECT	PROJECT COST	RECEIPTS			EXPENDITURE			REFUNDED TO THE GOVT	NET FUNDS AVAILABLE (6 - 9-10)
			UPTO 2014-15	2015-16	TOTAL (4 + 5)	UPTO 2014-15	2015-16	TOTAL (7 + 8)		
1	2	3	4	5	6	7	8	9	10	11
1	Design Analysis of Lightweight aluminium intensive city transit bus for maximum light weighting for Indian Conditions	484.00	484.00		484.00	396.43	52.43	448.86	35.14	0.00
2	Offline and Real time simulator for Electric Vehicle/Electric Vehicle Systems	1155.83	603.00	553.00	1156.00	627.05	420.91	1047.96		108.04
3	Material Compability & Emmission Performance with Ethanol Blended Gasoline (E20)	331.00	50.00	245.00	295.00	100.90	193.87	294.77		0.23
4	Study of Multi-disciplinary approaches / challenges in light weighting / perfomance improvements with focus on design optimization of components,systems	400.00		100.00	100.00		15.00	15.00		85.00
5	Development of Advanced Low Temperature Diesel Combustion(LTC) System to achive Euro-V & Euro VI Emission with considered conversion efficiencies	615.00		200.00	200.00		4.98	4.98		195.02
6	Development of Duty Cycle of Public & Goods Transport Vehicle separately(Intercity bus & Truck application) & arrive guidelines for estimating Vehicle	325.00		125.00	125.00		72.98	72.98		52.02
7	Source apportionment of PM2.5 & PM10 of NCR for Indentification of Major sources	600.00		200.00	200.00		48.37	48.37		151.63
8	Development of Lightweight Bus Prototype with Aluminium (AL) Superstructure for Indian City Application	950.00		200.00	200.00			0.00		200.00
9	Supercharging of Small (Single & Two Cylinder ) Diesel Engines	125.00		50.00	50.00			0.00		50.00
10	Development of EV2 Wheeler Kit	563.50		563.50	563.50					563.50
11	Study & Development & Lightweight Forging Process for Automotive Components.	380.00	100.00	100.00	200.00	26.75	55.16	81.91		118.09
	<b>TOTAL</b>	<b>5,929.33</b>	<b>1,237.00</b>	<b>2,336.50</b>	<b>3,573.50</b>	<b>1,151.13</b>	<b>863.69</b>	<b>2,014.81</b>	<b>35.14</b>	<b>1,523.54</b>
	<b>PREVIOUS YEAR</b>	<b>5,585.83</b>	<b>3,054.50</b>		<b>3,054.50</b>	<b>4,216.94</b>		<b>4,216.94</b>	<b>81.91</b>	<b>85.87</b>

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Statement Showing the Receipts and Payments on Projects Funded by NARTRIP

(Rs. in Lakhs)

SR. NO	NAME OF THE PROJECT	PROJECT COST	RECEIPTS		PAYMENTS		Expenses borne by ARAI 2014-15	Expenses borne by ARAI 2015-16	NET FUND AVAILABLE AS ON 31.03.2016	
			UPTO 2014-2015	2015-2016	TOTAL	UPTO 2014-2015				2015-2016
1	EXPANSION OF EXISTING FACILITIES AT SDL	200.00	200.00	0.00	200.00	198.25	0.00	198.25	0.00	1.75
2	PROCUREMENT OF ENGINE TEST EQUIPMENTS / INSTRUMENTS FOR CELL C2 OF NEW EDL	59.38	59.38	0.00	59.38	52.73	0.00	52.73	0.00	6.65
3	DEVELOPMENT OF CIVIL INFRASTRUCTURE UNDER NATRIP PROJECT	5509.00	5509.00	0.00	5509.00	8250.87	1350.79	9601.66	2741.87	0.00
4	Depository Work for PWT4- HVAC ARAI A/c.	965.00	965.00	0.00	965.00	774.66	203.05	977.71	0.00	0.00
	<b>TOTAL</b>	<b>6733.38</b>	<b>6733.38</b>	<b>0.00</b>	<b>6733.38</b>	<b>9276.52</b>	<b>1553.83</b>	<b>10830.36</b>	<b>2741.87</b>	<b>8.39</b>
	<b>PREVIOUS YEAR</b>	<b>6733.38</b>	<b>6733.38</b>		<b>6733.38</b>	<b>9276.52</b>		<b>9276.52</b>	<b>2741.87</b>	<b>198.72</b>

**APPENDIX - II**

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Statement Showing Receipts and Payments for Inspection Maintenance Project Cell for the Year 2015-2016

(Rs. in Lakhs)

SR NO	NAME OF THE PROJECT	PROJECT COST	RECEIPTS					PAYMENTS					NET FUND AVAILABLE		
			2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	TOTAL	2011-2012	2012-2013	2013-2014	2014-2015		2015-2016	TOTAL
1	SETTING UP OF A MODEL INSPECTION & CERTIFICATION CENTRE AT NASIK IN MAHARASHTRA	1440.00	140.00	385.00	-	200.17	22.94	748.11	0.63	110.65	184.23	327.93	145.83	769.26	-21.16
2	SETTING UP OF A MODEL INSPECTION & CERTIFICATION CENTRE AT RAILMAGARA IN RAJASTHAN	1440.00	-	240.00	295.00	194.91	16.64	746.55	0.50	61.61	211.08	317.49	92.19	682.87	63.67
3	SETTING UP OF A MODEL INSPECTION & CERTIFICATION CENTRE AT NELAMANGALA, BANGALORE DISTRICT IN KARNATAKA	1440.00	140.00	-	385.00	-	230.80	755.80	0.66	62.28	168.71	260.89	190.89	683.43	72.37
4	SETTING UP OF A MODEL INSPECTION & CERTIFICATION CENTRE AT MALKAPUR IN HYDERABAD DISTRICT IN ANDHRA PRADESH	1440.00	-	-	40.00	-	1.31	41.31	-	0.56	11.24	11.24	0.00	23.03	18.27
5	SETTING UP OF A MODEL INSPECTION & CERTIFICATION CENTRE AT OLPADA IN SURAT DISTRICT IN GUJARAT	1440.00	-	-	40.00	-	1.38	41.38	-	0.56	16.85	11.24	0.00	28.65	12.72
6	SETTING UP OF A MODEL INSPECTION & CERTIFICATION CENTRE AT CUTTACK IN ODISHA	-	-	-	-	208.00	208.00	208.00	-	-	-	-	5.44	5.44	202.56
	<b>TOTAL</b>	<b>7200.00</b>	<b>280.00</b>	<b>625.00</b>	<b>760.00</b>	<b>395.08</b>	<b>481.06</b>	<b>2541.14</b>	<b>1.79</b>	<b>235.66</b>	<b>592.11</b>	<b>928.79</b>	<b>434.35</b>	<b>2192.70</b>	<b>348.45</b>
	<b>PREVIOUS YEAR</b>	<b>7200.00</b>	<b>280.00</b>	<b>625.00</b>	<b>760.00</b>	<b>395.08</b>	<b>-</b>	<b>2060.08</b>	<b>1.79</b>	<b>235.66</b>	<b>592.11</b>	<b>928.79</b>	<b>-</b>	<b>1758.35</b>	<b>301.74</b>

APPENDIX - III

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Statement of Receipts & Expenditure on Plan Projects

#### APPENDIX - IV

(Rs. in Lakhs)

Sr. No.	NAME OF THE PROJECT	PROJECT COST	RECEIPTS			EXPENDITURE			NET FUNDS AVAILABLE (6 - 9)
			UPTO 2014-15	2015-16	TOTAL (4 + 5)	UPTO 2014-15	2015-16	TOTAL (7 + 8)	
1	2	3	4	5	6	7	8	9	10
1	Establishment of Testing Infrastructure for Certification Testing Of Electric & Hybrid Vehicles	5000.00		3000.00	3000.00		122.63	122.63	2877.37
2	Preparation for Specification & Finalising Draft Standards of XEV charging station	15.00		15.00	15.00		0.95	0.95	14.05
	<b>TOTAL</b>	<b>5,015.00</b>	<b>-</b>	<b>3,015.00</b>	<b>3,015.00</b>	<b>-</b>	<b>123.58</b>	<b>123.58</b>	<b>2,891.42</b>

# THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

## Fixed Assets Schedule - From 1.4.2015 to 31.3.16

### APPENDIX - VI

(Rs. in Lakhs)

Particulars	GROSS BLOCK				DEPRECIATION				NET BLOCK	
	As on 31-03-2015	Additions during the year	Deductions during the year	As on 31-03-2016	As on 31-03-2015	Deductions during the year	Provided during the year	Total upto 31.3.2016	As on 31-03-2016	As on 31-03-2015
I. LAND	2,345.75	0.00	0.00	2,345.75	0.00	0.00	0.00	0.00	2,345.75	2,345.75
A) Free Hold Land *	1,193.62	0.00	0.00	1,193.62	0.00	0.00	0.00	0.00	1,193.62	1,193.62
B) Lease Hold Land	1,152.13	0.00	0.00	1,152.13	0.00	0.00	0.00	0.00	1,152.13	1,152.13
II. BUILDING & ROADS ETC.	5,759.34	31.02	2.66	5,787.70	1,692.40	2.12	266.34	1,956.62	3,831.08	4,066.94
III. PLANT & MACHINERY	28,551.50	4,154.55	512.58	32,193.46	12,619.31	189.20	1,807.48	14,237.59	17,943.84	15,932.19
IV. UNDP EQUIPMENT RECD. IN KIND	308.51	0.00	31.67	276.84	279.35	30.46	2.68	251.56	25.28	29.16
V. FURNITURE & FIXTURES	520.91	22.96	0.27	543.60	327.04	0.22	54.14	380.96	162.64	193.87
VI. OFFICE EQUIPMENTS	274.60	10.28	1.64	283.24	208.09	1.42	32.67	239.35	43.89	66.51
VIII. COMPUTER & PERIPHERALS	1,265.77	145.75	91.74	1,319.78	1,133.17	29.85	132.41	1,235.73	96.09	132.61
IX. VEHICLES	481.71	119.92	54.62	547.00	310.63	47.21	91.35	354.77	192.23	171.07
X. AIR-CONDITIONERS	476.20	0.34	-	476.54	358.33	0.00	30.61	388.94	87.60	117.87
XI. Intangible Assets										
A) Computer Software	1,592.76	20.00	0.00	1,612.77	1,183.77	39.34	190.49	1,334.92	277.85	409.00
B) PATENT										
<b>Total</b>	<b>41,577.05</b>	<b>4,504.82</b>	<b>695.18</b>	<b>45,386.70</b>	<b>18,112.09</b>	<b>339.82</b>	<b>2,608.24</b>	<b>20,380.44</b>	<b>25,006.25</b>	<b>23,464.96</b>
CAPITAL WORK IN PROGRESS									25,669.62	20,826.99
<b>GRAND TOTAL</b>	<b>41,577.05</b>	<b>4,504.82</b>	<b>695.18</b>	<b>45,386.70</b>	<b>18,112.09</b>	<b>339.82</b>	<b>2,608.24</b>	<b>20,380.44</b>	<b>50,675.87</b>	<b>44,291.95</b>
PREVIOUS YEAR GROSS TOTAL	36,353.47	19,279.90	235.91	62,404.00	14,433.76	174.67	2,853.00	18,112.10	44,291.95	27,925.04

\* Out of which Rs. 1167.58 Lakhs pertains to the Land of Forest Department which is occupied by ARAI as an occupier.

## THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

### Fixed Assets Schedule - 2015-2016 (Assets Procured Out of Government Funds)


Particulars	GROSS BLOCK			DEPRECIATION			NET BLOCK		
	As on 31-03-2015	Additions during	Deductions during	As on 31-03-2016	As on 31-03-2015	Deductions during the year	Total upto 31.3.2016	As on 31-03-2016	As on 31-03-2015
I. LAND	20.92	0.00	0.00	20.92	0.00	0.00	0.00	20.92	20.92
II. BUILDING & ROADS ETC.	3,670.33	7.02	0.00	3,677.35	1,324.33	0.00	1,538.97	2,138.37	2,346.00
III. PLANT & MACHINERY	17,751.53	92.67	10.23	17,833.96	9,012.00	9.23	9,855.26	7,978.71	8,739.53
IV. UNDP EQUIPMENT RECD. IN KIND	308.51	0.00	20.53	287.98	302.34	19.81	283.04	4.94	6.17
V. FURNITURE & FIXTURES	124.04	0.00	0.03	124.01	87.87	0.02	97.21	26.80	36.18
VI. OFFICE EQUIPMENTS	21.29	0.00	0.00	21.29	16.36	0.00	18.58	2.72	4.94
VII. COMPUTER & PERIPHERALS	343.18	11.31	50.00	304.48	339.14	41.10	301.21	3.27	4.04
VIII. VEHICLES	46.74	0.00	6.58	40.16	40.41	5.98	36.91	3.23	6.33
IX. AIR-CONDITIONERS	308.87	0.00	0.00	308.87	244.52	0.00	261.19	47.69	64.34
X. Intangible Assets									
A) Computer Software	453.48	0.00	0.00	453.48	383.84	0.00	415.22	38.25	69.63
B) PATENT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL (IV)	453.48	0.00	0.00	453.48	383.84	0.00	415.22	38.25	69.63
<b>Total</b>	<b>23,048.87</b>	<b>111.00</b>	<b>87.37</b>	<b>23,072.50</b>	<b>11,750.80</b>	<b>76.15</b>	<b>12,807.60</b>	<b>10,264.90</b>	<b>11,298.08</b>
CAPITAL WORK IN PROGRESS								6,049.89	5,867.54
<b>GRAND TOTAL</b>	<b>23,048.87</b>	<b>111.00</b>	<b>87.37</b>	<b>23,072.50</b>	<b>11,750.80</b>	<b>76.15</b>	<b>12,807.60</b>	<b>16,314.79</b>	<b>17,165.62</b>
Previous year Gross Total	20,459.20	2,701.46	111.78	23,048.88	10,520.42	96.36	11,750.82	17,165.61	15,562.54

## ARAI Organisation Chart



**Mrs. Rashmi Urdhwaeshe**  
Director-ARAI  
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### RESEARCH & DEVELOPMENT DIVISION 1

<p>Structural Dynamics Lab.; Automotive Materials Lab.</p>  <p><b>Mr. M. R. Saraf</b> Senior Deputy Director mrsaraf.sdl@araiindia.com</p>	<p>Noise, Vibration &amp; Harshness Lab., CAE</p>  <p><b>Mr. N. V. Karanth</b> Senior Deputy Director karanth.nvh@araiindia.com</p>
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### RESEARCH & DEVELOPMENT DIVISION 2

<p>Powertrain Engg., Prototype Mfg. Dept.</p>  <p><b>Mr. N. V. Marathe</b> Senior Deputy Director nvmarathe.edl@araiindia.com</p>	<p>Automotive Electronics Dept., Information Technology Management</p>  <p><b>Mr. A. A. Deshpande</b> Deputy Director deshpande.aed@araiindia.com</p>
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### HOMOLOGATION DIVISION

<p>Vehicle Evaluation Lab. Homologation Management &amp; Regulation</p>  <p><b>Mr. A. Akbar Badusha</b> Senior Deputy Director badusha.vel@araiindia.com</p>	<p>Safety &amp; Homologation Lab., Passive Safety Lab.</p>  <p><b>Mr. A. V. Mannikar</b> Senior Deputy Director mannikar.shl@araiindia.com</p>	<p>Emission Certification Lab.</p>  <p><b>Mr. K. Srinivas</b> Senior Deputy Director srinivas.ecj@araiindia.com</p>
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### SERVICE DIVISION

<p>Business Development &amp; Corporate Planning</p>  <p><b>Mr. N. B. Dhande</b> Senior Deputy Director dhande.dts@araiindia.com</p>	<p>Infrastructure Development, and Special Projects</p>  <p><b>Mr. S. M. Haragapurkar</b> Senior Deputy Director haragapurkar.shl@araiindia.com</p>	<p>Knowledge Centre</p>  <p><b>Dr. K. C. Vora</b> Senior Deputy Director vora.pga@araiindia.com</p>	<p>Central Maintenance Cell</p>  <p><b>Mrs. M. S. Mainkar</b> Deputy Director Mainkar.ecj@araiindia.com</p>
<p>Finance &amp; Accounts, Purchase, and Stores</p>  <p><b>Mr. S. M. Shahane</b> Deputy Director shahane.acc@araiindia.com</p>	<p>Human Resource Management &amp; Administration</p>  <p><b>Dr. M. V. Uchgaonkar</b> Deputy Director uchgaonkar.pah@araiindia.com</p>	<p>Quality Management Department, Calibration Lab</p>  <p><b>Mr. V. K. Jadhav</b> General Manager jadhav.gmd@araiindia.com</p>	<p>Governing Council Secretariat</p>  <p><b>Mrs. P. M. Dhare</b> Deputy General Manager Secretary to the Governing Council dhare.acc@araiindia.com</p>





# New Facilities Established



EMC Chamber for 2W, 3W, Automotive and Industrial Components

Motorized Modular Frame for Multi-channel Test



3 Axis Coordinate Measurement System

Seat Belt Anchorage Test Rig



Stereo Microscope

Cornering Fatigue Test System for Wheel Rim



Vehicle Head lamp Alignment Equipment



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